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SERUM THERAPY OF STREPTOCOCCUS INFECTION
AUGUSTUS B. WADSWORTH

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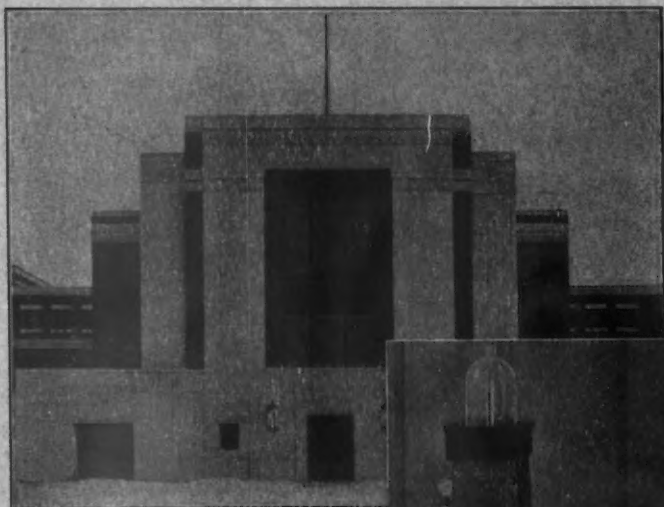
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CANADIAN PUBLIC HEALTH JOURNAL

VOL. XXIV

January, 1933

No. 1

Serum Therapy of Streptococcus Infection*

AUGUSTUS WADSWORTH, M.D.

Director, Division of Laboratories and Research, New York State Department of Health, Albany

THE streptococci, more perhaps than any other pathogenic species, exhibit the most striking, the most illusive, and the most divergent biologic characteristics. They have, from the beginning, eluded all attempts at systematic classification in relation to the wide range of disease processes incited by them in the different tissues of the body, despite the fact that these manifestations of infection include certain sharply defined lesions and symptom complexes which tradition has long recognized as specific diseases. The history of research into the etiology and serum therapy of these infectious processes of the streptococci has seemingly repeated itself. From time to time, the identification of a specific streptococcus as the incitant of one or another of these diseases has been claimed, enthusiastically accepted, reviewed critically, and finally discarded. Yet there has been a step forward with each cycle. Advancing knowledge in the broad field of infection and immunity has not only sharpened critical acumen but has also brought a larger conception of the significance of earlier observations, which could not be fully grasped until traditional notions regarding the specificity of disease were impugned.

The etiological relationship of the streptococcus to puerperal fever, to septic sore throat, and to erysipelas is no longer questioned, but claims identifying a specific streptococcus as the incitant have been practically abandoned. Scarcely a lingering expectation that some unique distinguishing character may yet be revealed by further investigation survives. Classification of the streptococci has defied the taxonomist. Even toxin production was long doubted, and I recall that, nearly twenty years ago, I reported, for this reason, observations demonstrating the presence of toxin in a case of purpura hemorrhagica due to a streptococcus abscess; suggesting also the subtle mechanism of its action in the tissues as a result of immunization with toxin obtained

*Presented at the 21st annual meeting of the Canadian Public Health Association, Toronto, May, 1932.

by growth of the homologous streptococcus in human blood broth—methods practically identical with those which we are now using intensively for the same purpose.

Failure of the early Russian and German work to establish a specific streptococcus as the incitant of scarlet fever, which tradition, since the days of Sydenham, has defined as a specific disease, relegated the etiological relationship of the streptococcus to that of a secondary incitant. The sera produced by those earlier investigators, for the treatment of the severe cases of the disease, then more frequent than at the present time, evidently lacked potency, and the results did not justify the continuance of that kind of treatment.

Although the studies of Dochez and the Dicks have revived interest in the serum therapy of scarlet fever, the bacterial etiology, if specific, that is, due to a particular incitant, cannot be regarded as established beyond question. With advancing knowledge and the development of new methods of determining the specific relations of the pathogenic micro-organisms to the disease processes incited by them, the original postulates of Koch, which he developed as a student of Henle, have been materially enlarged upon and promulgated in various forms by the recent authorities. One must be cautious in accepting too literally these modifications. An essential principle, which Koch stressed particularly, is the necessity of guarding against the possibility of contamination—the introduction of another micro-organism—at every step of the procedures. With the recognition of filtrable viruses as incitants of disease, the fulfilment of Koch's postulates has become increasingly complicated and complete control most difficult. In the experiments with the streptococci, the presence of some other micro-organism as the primary incitant has not been so convincingly excluded as to leave no doubt. Moreover, the toxins of the hemolytic streptococci which have been isolated from different forms of streptococcus infection vary greatly, not only in their action in the tissues of different animal species but also in the extent to which they are neutralized by immune sera or antitoxins. The different strains might conceivably be classified into groups according to these reactions but in our study of at least 1000 strains, no one group was associated specifically with any particular symptom complex—quite the contrary; representatives of the several groups were found in the different diseases incited by the streptococci. The results of this study of the interaction of these toxins with their antitoxins in a number of animal species and in different individuals of each species suggest that subtle conditions of tissue susceptibility underlie the mechanisms of these reactions. Thus, the individual strains of any empirical grouping differ in such varying degrees and often in such a characteristic manner as to suggest that they represent various stages or phases of biologic attenuation, doubtless resulting from their previous environment. The strains isolated from the throats, or from the blood stream, of scarlet fever patients

toxins which may have a narrow or an extremely broad valency, a high or a low potency when they are tested on susceptible animals. This is true also of streptococci isolated from other streptococcus processes. Tests on the human subject reveal the fact that a toxin, when injected intracutaneously, may incite a reaction which is neutralized by an immune serum in one susceptible individual and not in another. Similarly, tests of the neutralizing action of immune sera produced in different animal species disclose differences in activity which apparently depend upon the species in which the tests are made. The individual animals of a species vary in the degree of their susceptibility, and this variation is apparently even more distinct when the tests are made on the human subject.

The immune sera obtained by immunization with different strains of streptococci also vary in the extent to which they neutralize heterologous toxins. The neutralization may be partial or complete, or there may be no interaction apparent. For example, the toxins of two closely related strains may both be neutralized by the immune serum produced with one of the strains, whereas the immune serum produced with the other may neutralize only its homologous toxin.

Not only do the toxins of the hemolytic streptococci isolated from all forms of streptococcus infection exhibit these varying reactions with immune sera but the virulence also varies, as determined by tests in laboratory animals. Strains which are virulent for mice may or may not produce highly potent toxins, while those which produce toxins are not necessarily virulent. Finally, it is important to note that many of the strains from fatal bacteremic processes lack not only virulence when tested in laboratory animals, but also toxin production. The hemolytic streptococci thus appear to present widely varying degrees of biologic activity, doubtless as the result of attenuation.

These observations suffice to suggest the complex mechanism that underlies the action of the streptococcus toxin in the tissues and its neutralization by an immune serum or antitoxin. Meagre as our knowledge of these obscure phenomena is, it must, nevertheless, determine the selection of strains for the production of the immune sera or antitoxins which are to be used in the treatment of infection.

The potency and the valency of the sera which are to be used in the treatment of infection are of the utmost importance. The sera generally available have not been satisfactory, despite the efforts that have been made to improve them. In 1927 a minimum standard of potency, namely, 200 units per cc., together with methods of testing with standard toxin and antitoxin for control, was established by the federal authorities. Although the sera have improved under this regulation, the results of our tests since 1927 have revealed a lack of potency and valence in these sera with some of the toxins.

Accordingly, the Public Health Council of New York State, with the approval of the National Institute of Health, established independently

a standard of potency of 400 units per cc. The methods of testing do not differ essentially but the standard toxin is different and it now appears that the adoption of the state regulations excludes even those sera which are manufactured under license of the Scarlet Fever Committee and are approved by them for distribution. The titration of sera offered for sale in New York State, according to these different standards, discloses quite marked differences and especially when compared with the serum produced and distributed by the State Laboratory in Albany. Not only is this serum monovalent, that is, produced by one strain, but it is also unconcentrated. Its potency ranges from 700 to 900 units per cc. irrespective of whether the titrations are made according to the federal or the state standard. The other sera, samples of which were purchased and tested, were concentrated preparations and produced with four or more strains of streptococci. The titrations range from barely in excess of 200 units to a maximum in one instance of 600 units with the federal toxin; with this one exception the titrations indicated less than 400 units. According to the state standards, these sera range from less than 50 units per cc. to a maximum of 400. It is interesting to note that the majority of these titrations reveal a potency of less than 200 units per cc. Comparison of the titrations by the two methods of standardization is, therefore, an indication of valence which is evidently narrow in many commercial products, despite the fact that they were produced with four or more strains. Moreover, they are all refined globulins, although the practical value of concentrating anti-streptococcus sera has not been established save as a means of improving those of low potency. Laboratory tests do indeed indicate a marked increase in the unit value per cubic centimeter; for example, a serum of from 800 to 900 units titrates, after concentration, over 3000 units, but there is also between two and three times as much protein in the refined product. Whether or not the concentrated preparation is therapeutically more effective is not yet clear. The reactions following the administration of serum of high potency, even by the intravenous route, appear to be less marked than those reported with the concentrated product.

Traditional conceptions of scarlet fever as a specific disease must give way if the streptococcus is to be accepted as the incitant. Scarlet fever and erysipelas are now in practically the same category, that is, must be regarded simply as different manifestations of streptococcus infection developing under special conditions of tissue susceptibility, since there is no known method of distinguishing between the so-called *Streptococcus scarletinae* and the *Streptococcus erysipelatus*. Whether the relationship of the streptococcus to scarlet fever is a primary or a secondary one, the streptococcus processes are the ultimate objectives from the practical standpoint of effective serum therapy.

Reports have been received on the treatment of severe types of streptococcus infection with bacteremia, the recovery of which has

been attributed to serum therapy. Whether or not the serum treatment was the determining factor must, however, be considered uncertain. Such cases sometimes recover without serum treatment, but the fact that they do is the very reason why serum that will aid the protective mechanism should be used, and used intensively. Certainly there is no other treatment that is of avail and it is difficult to conceive of a serum that will neutralize the toxic products of an infectious process and yet fail to aid the protective mechanism. It is only a question of potency and valency.

The serum which we are now distributing for the treatment of streptococcus infection is monovalent, being prepared by the immunization of horses with a single strain of streptococcus—the Dochez N.Y. 5. It is not concentrated and its antitoxic potency, as determined by titration against both the federal and the state standard toxins, is at least 800 units per cc. It has definite protective action, as determined by tests in mice.

Physicians independently have sensed, so to speak, the possibility that the antistreptococcus serum which was at first distributed for the treatment of scarlet fever might also be of value in the treatment of other forms of streptococcus infection and, especially since there is no other effective treatment available for many of the severe infections, they have used it for that purpose. The reports which we have received therefore include many forms of streptococcus infection. Tabulated to date, these total 1,052 cases of scarlet fever and 194 of erysipelas, as well as a number of miscellaneous infections, including septic sore throat. The febrile reaction in scarlet fever, whether mild or severe, is often so evanescent that what appears to be the effect of the serum is spectacular. It is difficult to determine to what extent the serum affects the crisis of recovery that might occur spontaneously. It is only in the severest types of toxemia, and as a result of the careful analysis of individual cases, that the evidence of the favourable action of the serum is unquestionable.

Reports on the serum therapy of 587 cases of scarlet fever, first published in 1929, together with 465 more recent cases, make a total of 1,052, of which 402 were classified as severe, 441 moderate, and 209 mild. The mortalities in these three groups were 10 per cent, 0.9 per cent, and 0 per cent respectively. The total mortality was 4.3 per cent. Of the 46 fatalities, 42 occurred in the group of severe cases and 4 in those which were considered mild. Thirty-five of the 46 cases had complications. Of the 11 which had no complications, 2 were fulminating types, 1 was severely toxic, and 8 received their first dose of serum less than 24 hours before death. In this series many of the cases were inadequately treated, and these and all cases in which the treatment was so delayed that the first dose of serum was not given until 24 hours before death should be eliminated from any series of cases, the results of which are to be interpreted as indicative of the practical value of

serum therapy. It is rather difficult, however, to distinguish cases which are inadequately treated or to determine how late in the course of the disease the administration of serum ceases to be significant of its practical value. Hence, in these statistics, they have been included.

Considering the large proportion of severe and moderate cases in this series and also the complications that occurred, the results suggest that serum therapy was of practical value despite the fact that the dosage, in general, was inadequate, especially for the treatment of severe or seriously complicated cases. The general impression that the serum has no effect on the complications of scarlet fever has unfortunately influenced the treatment of such cases and also the quantities of serum that have been used in the treatment of scarlet fever in general. This impression may be questioned, since the potency of the sera generally available has not been satisfactory. The only report that includes data upon which to base a comparison of the action of sera of different potency and of the concentrated and unconcentrated preparation is that of Veldee, in which series, however, it is practically impossible to determine the relative value of the sera because the cases were mild and developed comparatively few complications. Moreover, the dosage was inadequate for the treatment of complicated cases.

The effect of serum treatment in erysipelas is more significant of the action of the serum on processes characterized not only by severe toxemia but also by parasitic invasion of the tissues. Nevertheless, the same difficulties are experienced in the reports on the treatment of this disease—although not to the same extent. In some instances, the effect of the serum on the local processes of the skin is almost coincident with the effect on the toxemia but usually it follows after a longer or shorter interval. There are cases in which the serum has no apparent effect. Whether this is due to a lack of valency in the serum or to the stage the streptococcus process has reached cannot be determined from the data of the reports, since it would be necessary to test the neutralization by the serum of the toxin of the particular strain giving rise to the infection. The results of serum treatment in 194 cases of erysipelas with a mortality of 8.2 per cent were quite comparable to those reported in the series of scarlet fever with complications. One hundred and six of these cases were classified as severe, 53 and 16 as moderate and as mild, respectively. The value of prompt, early treatment with adequate dosage was manifest. Doubtless, the mild cases of scarlet fever or erysipelas do not need serum, but it is difficult to forecast the course of the disease; and if the serum treatment is to be given, the dosage should be adequate for the severe or complicated case—10,000 to 20,000 units—and the treatment should be continued intensively, if necessary, at 12 to 24-hour intervals, depending upon the results obtained.

The reports on the treatment of miscellaneous forms of infection include a variety of conditions—with and without bacteremia—in some of which a combination of serum therapy with surgical treatment

appeared to be most effective. The results in cases of septic sore throat were, with scarcely an exception, even more striking and spectacular than in scarlet fever, or erysipelas, especially when the serum was administered early.

Careful analysis of the treatment of the more serious forms of streptococcus infections, especially those with bacteremia, offers the more convincing data concerning the practical value of antistreptococcus serum and its limitations. While the reports which have been received to the present time are for the most part favourable, even more complete information is expected to accrue from the treatment of a number of cases with the concentrated serum that titrates approximately 3000 units per cc.

The serum therapy of streptococcus infection is still in the early stages of its development. Further progress depends upon an intensive study of the toxins produced by the different streptococci, and of their antigenic activity in the production of therapeutic sera of high potency and broad valence. Streptococci, in the course of generalized infection, may become attenuated and spontaneous recovery may ensue. In such cases the protective mechanisms, unaided, destroy the bacterial incitants that have invaded the tissues. Potent sera of requisite valence which neutralize the toxic products of the infectious processes in practically all forms of disease induced by this pathogenic species, aid the protective mechanism of the tissues in varying degree, and within limitations as yet undetermined. Indications for serum therapy are, therefore, evident and rational.

The Editorial Board will be glad to receive copies of the JOURNAL for

APRIL, 1928, and JULY, 1929

and to remit thirty-five cents in stamps for each copy.

The Development of a Provincial Mental Health Service*

B. T. MCGHIE, M.D., C.M. (Qu.)

Director of Hospital Services, Ontario Department of Health

THE success of a provincial mental health service, like that of any other organization, is in a large measure dependent on the ability and initiative of its personnel. When the Ontario Government endorsed the organization of a mental health clinic service for a population of over three million persons in an area the size of this province, the most difficult problem was the securing of suitable personnel and also the establishing of centres from which this staff could operate so as to serve the various districts at a minimum of expense.

The personnel of the mental health clinic as constituted in this province includes a director—a physician who is a psychiatrist—a psychologist, and one or more social workers. Psychiatrists in sufficient numbers were to be found only in our Ontario mental and psychiatric hospitals, and the study of the geographical locations of these institutions soon suggested the advisability of making the mental hospitals the headquarters of the mental health clinic for their respective districts.

This decentralization in the organization of such a service has some disadvantages from the point of view of head office supervision, but these are more than outweighed by the benefits of such a system. The psychiatrist and his staff, being resident in the district which they serve, more readily become a part of the other health and community services, and being linked up with an established service that has been in existence for the better part of a century as a provincial undertaking, gives the clinic more stability than would be the case in a travelling clinics sent out from a central office.

The clinic's existence as an extramural service of the mental hospital has a beneficial effect on both the clinic and hospital staff. The clinic staff, in its weekly conference with the superintendent and his medical officers, have the benefit of their experience in problem cases, while the hospital staff is brought into closer touch with social psychiatry. It is thus of special benefit in the training of the junior members of the hospital service.

Directors of mental health clinics, to render the service that has been required of them in this province, need to be physicians with a background of institutional psychiatric experience of at least two years' duration, plus special training that has heretofore not been given as a part of psychiatric training in this province.

*Presented at the 21st Annual Meeting, Canadian Public Health Association, Toronto, May, 1932.

The psychologist who is to undertake personnel studies in the clinic group requires more than an academic background, and, for three years before our clinics were organized in Ontario, we were fortunate in having an arrangement with the Department of Psychology of the University of Toronto whereby their graduate students were able to obtain clinical experience in our mental hospitals. When our clinics were finally organized, we were, therefore, able to secure from among these former students competent clinical psychologists for this work.

We were not so fortunate in respect to securing from the Social Science Department of our University students who had psychiatric experience, but what we lacked in number at the beginning was, in a large measure, made up by the quality and zeal of the few pioneers who undertook this work. Their number was made up of experienced social workers, public health nurses, and nurses with special training in psychiatry.

The Social Science Department and nurses' training schools are now availing themselves of the clinical facilities in our service for training their students in field work.

In May, 1930, a staff, comprised of the psychiatrists, psychologists and social workers that had thus been chosen, was brought together at Orillia for an intensive course of instruction which extended over a two weeks' period. Professors from four universities and representatives from practically every provincial agency and organization doing active work in health or public welfare made this course both interesting and profitable.

This group, during the following summer and fall, organized seven mental health clinics in as many centres in Ontario. During the past year, we were also successful in securing the services of Dr. E. P. Lewis from the Mental Hygiene Division of the Toronto Department of Public Health, to direct for us the mental health clinic in the Psychiatric Hospital, Toronto. These seven clinics now serve over seventy centres in the Province of Ontario and examined, up to October 1931, 3210 patients, as shown in Table I.

TABLE I

CASES EXAMINED BY THE SEVEN CLINICS, JULY, 1930, TO OCTOBER, 1931 (INCLUSIVE)

<i>Clinic</i>	<i>Number of cases</i>
Toronto.....	736
London.....	582
Hamilton.....	608
Whitby.....	436
Brockville.....	401
Orillia.....	288
Kingston.....	159
Total.....	3,210

These groups have acted chiefly in a consulting capacity, operating

through the existing health organizations, and making recommendations as to therapy for the guidance of the physician, social agency, or other organization referring the case. Actual psychotherapy has been undertaken only in selected cases, either at the request, or with the consent of the referring agency.

As at present organized, these clinics have a two-fold duty to perform; namely, acting as a service clinic and providing a mental health educational program. As a service clinic, the staff assists in the examination and care of:

1. Mental defectives,
2. Epileptics,
3. The mentally ill,
4. Convalescent mental cases,
5. Those appearing before the courts.

The mentally defective child who cannot be cared for in the special classes organized for that purpose throughout the province, or who, because of lack of proper understanding and training, becomes a problem in the community, or whose home situation necessitates some other plan of care and training—of 2,474 cases examined by the clinics, 980 or 39 per cent were of this type. During this period, 363 were admitted to the Ontario Hospital, Orillia.

Where the home situation is satisfactory, and auxiliary and vocational classes available, the average child falling in the moron group does not require institutional care, at least during the school period; but where both proper school and home facilities are lacking, the child of this type will be gathered in, either through the industrial schools or the Orillia institution.

No provision is made for training the imbecile child, even though its home care is adequate. Lacking sufficient accommodation for caring for this group in an institution, a "home training" program was prepared which would be of assistance to an intelligent mother under the guidance of a public health nurse or social worker. I would like to cite two or three such cases:

(1) In one centre, a child with C.A. 12-4, M.A. 4-10, I.Q. 40, with a speech defect, inability to enunciate words when brought to the clinic, started the training course in November, 1930. In September, 1931, the child could write the letters of the alphabet, read from the first eight pages of the primer, and make change for two dollars; in December, 1931, he made toy croquet sets and sold them for fifty cents; in January, 1932, he started work, helping to deliver wood, for which he is receiving one dollar a week.

(2) In another centre, a subject with a C.A. 8 years, M.A. 3-6, I.Q. 44, has covered levels I-III in kindergarten work as outlined. In addition, she made a small rag rug, and a woven felt cushion.

(3) Another subject, C.A. 8-4, M.A. 3-2, I.Q. 22, has been placed on phenobarbital therapy, has learned to clap his hands to music, grasp toys with his hands, throw a large ball, raise himself up beside a chair, and take a few steps with the guidance of his mother. The mother states various other exercises are practised to music with fair results.

As I see the present situation from the institutional point of view, this approach has its possibilities. We will never be able to keep

pace with this problem in our building program. Massachusetts, the state of the Union that has done most in the way of building, has a long waiting list for admission at all its training schools, and if a certain percentage can be cared for in their own homes by visiting teachers, this will no doubt be necessary. Is this then the task of the Board of Education or the Board of Health?

The policy instituted at the Ontario Training School at Orillia of training children of the moron group for positions in the community as domestics and farm labourers, and then establishing them in positions through a modified form of the colony system as used at the Rome State School of New York State, owes in a large measure its success to the follow-up which has been given through the clinic staff.

Epileptic

Our clinics found that 104, or 4.1 per cent of the cases examined were epileptic. The result of our investigation at Woodstock are available to the practitioner through the clinic. The ketogenic diet, if rigidly enforced, gives fairly good results in younger children, while in the adolescent and young adult, a period in an institution, building up a hygienic routine, and the dosage of phenobarbital until the seizures are under control, has given the best results. This takes from one to two years in a hospital.

In 173 cases or 7.3 per cent of those examined outside of Toronto, a definite psychosis was found, 62 or 2.5 per cent suffered from a psychoneurosis and 33, or 1.3 per cent from post-encephalitis. The examination and treatment of these patients can be considered as preventive psychiatry only in so far as the practice of intensive psychotherapy in an out-patient clinic may prevent an increasingly greater number of these people from reaching the mental hospital. In visiting the Mental Hygiene Institute in Montreal recently, I was interested to learn from the director, Dr. Mitchell, that probably as high as 20 per cent of the cases he is now able to treat through a clinic service would have been sent to a mental hospital under the system that prevailed five years ago. If, as our service is extended, we are able to accomplish something approaching this for this province, the mental health clinics will more than pay their way, both economically and from the humanitarian stand-point. In this connection, I may say that we have been able to obtain a definite follow-up report in 54 per cent of the cases examined. Of this number, where re-examination was undertaken, we have a record of an average of $2\frac{1}{2}$ contacts with each case, the range being from 2 to 13. Thus, you will see that the follow-up work alone more than doubles the work undertaken in the original examination of the three thousand odd cases.

The Convalescent Mental Patient

At the present time, the Ontario Hospital assumes some responsi-

bility for the convalescent patient when he leaves hospital. This service, conducted through the clinic, includes visits to the home by the social worker, and examination by the psychiatrist in the clinic nearest the patient's home, from time to time over a period of three to six months, depending on the requirements of the situation. One clinic in this way assisted in the re-establishment of some 200 cases from one hospital in the last two years.

Service to Courts and Welfare Agencies

Welfare agencies, Children's Aid societies and juvenile courts have availed themselves of the clinic service, and when I tell you that in addition to making surveys in three industrial schools, 1072 cases were examined for these agencies outside of Toronto, you will appreciate the extent of this work.

As a result of the service rendered the Ottawa Juvenile Court, Judge McKinley, now Chairman of the Parole Board, has requested a psychiatric service for the Parole Board, and we are also providing a psychiatric service to the reformatories, at the request of the Provincial Secretary.

Prevention

You will not, therefore, be surprised when I tell you that a provincial mental health staff carrying such a service load has had very little time for that part of the mental health programme which is true prevention. I refer to that public health education which is just as important in a mental health endeavour as it was in child welfare, tuberculosis or any other health movement. This has been carried on elsewhere under the name of habit training, child guidance, parent education, etc.

Our staff have not had time to do this very necessary work, but they have, in addition to what I have outlined, given approximately 600 addresses throughout the province. These were given chiefly to service clubs, home and school clubs, social workers, nurses-in-training, teachers, etc., so that many parts of the province have become keenly interested in mental health, and are, as a result, requesting leadership in securing more information with respect to the fundamentals of mental hygiene principles.

In our opinion, the greatest need in this field to-day is a text book dealing with mental health through the medical approach, to be used as a guide for physicians, not only in this particular field, but for the general practitioner, the public health nurse, and social worker.

We also feel the need for a greater opportunity for research, and during the next year intend to insist on our staff's getting such an opportunity, even at the expense of lessening the clinic load that they have carried heretofore.

The following statistical tables are to be found in our annual report, now in the hands of the publishers.

 TABLE 2
SOURCE OF CASES

	Number	Percentage
1. Welfare agencies.....	1,072	43
2. Medical agencies.....	915	37
3. Educational agencies.....	305	13
4. Family.....	128	5
5. Voluntary.....	30	1
6. Private persons (non-family)	24	1

Taken individually the most frequent sources are:
Children's Aid Society..... 539 cases—22%
Family physician..... 398 cases—16%
Public health nurse..... 255 cases—10%

 TABLE 3
TYPE OF PROBLEM

	Occurrences	Cases
1. Abnormal mental conditions.....	1,329	1,167
2. Behaviour difficulties.....	1,051	723
3. Abnormal physical conditions.....	708	630
4. Education problems.....	551	546
5. Routine examinations.....	305	305
6. Social difficulties.....	149	139

 TABLE 4
CLASSIFICATION OF CASES BY DIAGNOSIS

	Number of cases	Percentage of entire group of 2,474 cases
Superior.....	37	1.5
Normal.....	436	17.5
Undiagnosed.....	319	12.8
Dull normal.....	340	13.6
Borderline.....	362	14.5
Moron.....	582	23.3
Imbecile.....	330	13.2
Idiot.....	68	2.7

 TABLE 5
TREATMENT
Frequency

	Number	Percentage
1. Community care.....	1,608	64.0
2. Medical attention.....	1,155	44.6
3. Educational.....	771	29.7
4. Institutionalization.....	580	22.7
5. Re-examination.....	270	10.3
6. No treatment.....	109	4.3
7. "Psychotherapy".....	60	2.5
8. Deferred.....	14	.5
9. Deportation.....	8	.3

TABLE 6

DISTRIBUTION OF CASES ACCORDING TO NATIONAL EXTRACTION COMPARED WITH DISTRIBUTION OF POPULATION IN ONTARIO

National Extraction	No. of Cases	Percentage Cases	Ont. Census 1911
English.....	1,007	40.2	41.0
Scotch.....	307	12.2	16.0
Irish.....	299	12.0	19.0
Welsh.....	26	1.0
French.....	277	11.0	8.0
American Indian.....	20	.8	.9
German.....	79	3.1	4.7
Russian (Ukrainian).....	71	2.4	.5

TABLE 5A

COMMUNITY CARE

Home training course.....	404
Supervision by social agencies.....	274
Placement in foster home.....	218
Adjustment in home.....	148
Organized recreation.....	130
Twenty-one other types mentioned less frequently.	

TABLE 5B

MEDICAL ATTENTION

Tonsils and adenoids.....	272
Family physician.....	239
Medication (specified).....	154
Dental attention.....	108
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In conclusion, on behalf of the Provincial Department of Health, I would like to pay tribute to the fine body of men and women in this province, who, in addition to the heavy load they are carrying in the fields of public health and social welfare at this time, have patiently overlooked our mistakes (and these are bound to be numerous in a new undertaking like this), and rendered us such loyal assistance and encouragement.

Essentials in the Treatment of Early Syphilis*

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IN life and comfort and money, syphilis has cost as much as any war in history. Unlike the other problems that occupy the attention of economists, however, this can readily be solved. One can state definitely that syphilis can be prevented and that syphilis can be cured. If these statements are true—and they are true—then syphilis can be eradicated.

In this paper it is my chief purpose to tell you how syphilis can be eradicated in the individual. If every case were treated thoroughly and cured, a long step would be taken towards the universal eradication of the disease. From the standpoints of health and of economics the problem of syphilis is such a significant one that its proper treatment becomes one of the most important matters of the day.

Now let us see what proper treatment has actually accomplished. Through socialized efforts directed at the control of infectiousness, the incidence of new infections of syphilis has apparently decreased since 1919, five-sixths in Great Britain, two-thirds in Germany and nine-tenths in Belgium. It is unfortunate but true that in France and on this continent there is no such phenomenal decrease. The main object of our concerted efforts should be the prevention of the transmission of syphilis from person to person. As Parran has said, "Once given the ideal accomplishment of this aim, the disease should, in theory at least, disappear within the life of a single generation."

Early Diagnosis

The trend of modern medicine is to concentrate every effort on early diagnosis and immediate treatment and in no disease is the issue so vitally paramount as in the field of syphilis. For with co-operation on the part of the patient, it is possible to cure almost 100 per cent of patients with sero-negative primary syphilis, if the chancre is on the average of less than two weeks' duration.

The vast majority of primary lesions are seen first by the general practitioner and it is, therefore, most important that he, above all others, should be impressed with the need of determining at once the nature of the sore. Dr. V. C. Garner, University of Pennsylvania,

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emphasizes the importance of the laboratory in the early diagnosis as follows:

"Time has shown the wisdom of abandoning clinical impressions in the interpretation of the suspected lesion. The chancre has no invariable morphological characteristics; while time-honored clinical criteria such as indolence, induration and associated adenopathy arouse the suspicion of syphilis, they are never in themselves conclusive; and the burden of proof under all conditions rests on laboratory procedure. The dark field examination for *spirochetes pallida* has been shown to be the only way to identify early syphilis in the sero-negative phase."

Every genital lesion is to be regarded as syphilis until proved not to be. Even if repeated dark-field examinations are negative and the clinical picture be not typical, repeated blood Wassermann tests should be performed at intervals for three months. There should be no therapeutic test of primary syphilis. Treatment should never be started until the suspicion is proved and the physician is prepared to carry out the full course of treatment necessary for cure. No antiseptics of any kind should ever be applied to the presenting lesion until syphilis has been definitely ruled out as the causative factor. Since 65 per cent of all genital lesions are due to syphilis, every effort should be made to establish conclusively the presence or absence of this infection before a diagnosis of a relatively benign condition is accepted. The diagnosis of chancroid should be made only in retrospect, after repeated examinations for syphilis have yielded negative results. The presence of an intra-urethral chancre must, moreover, be suspected and looked for in cases of urethral discharge, in which the gonococci are not demonstrable. The diagnosis of early syphilis, then, requires more laboratory knowledge than clinical acumen.

Attention must be drawn here to clinical relapse as a source of infectiousness. Eighty-five per cent of these relapses occur in the first two years of the disease. The spread of the disease during relapse has never been fully appreciated by the general practitioner, because the lesions are relatively unobtrusive, painless and easily overlooked. The patient whose early symptoms have been abolished by a few doses of arsenic constitutes for an indeterminate period a danger to his community. So you see that the first step in the treatment of syphilis is early and accurate diagnosis, and this for two reasons: (1) in order to institute treatment and so prevent the spread of the disease; and (2) to prevent the development of the serious complications that inevitably follow inadequate or delayed treatment.

Treatment

What are we going to do for the patient suffering from early syphilis? The diagnosis has been made. How can we safely and surely eradicate this man's disease?

A definite schedule of treatment can and should be adopted for the treatment of early syphilis in all cases. While the medical treatment is of supreme importance, one must not neglect the observance of rules of general hygiene. The patient's general health must be maintained, alcohol must be forbidden and the use of tobacco strictly limited. Due attention must be paid to the eliminative functions, regular hot baths, copious water drinking and to the regulation of the bowels. The patient's mind should be set at ease and relieved of worry by the assurance of ultimate cure. But the treatment of syphilis is essentially medical.

Most authorities are agreed that the main reliance in early syphilis must be placed on the trivalent arsenicals, either 606 or 914, but one of the heavy metals, either bismuth or mercury or both, must be included in any plan adopted. The value of arsenic lies in the fact that it destroys the spirochete without damaging the tissues. Mercury, on the other hand, is not so destructive to the spirochete but stimulates the body cells to produce anti-bodies, while bismuth is intermediate between the two types of action. It is remarkable that a single dose of 606 destroys every surface organism and hence renders the patient non-infective within 24 hours of its administration. This sterilization is made permanent only by repetition of the arsenic at regular intervals for a long time. The action of mercury with respect to infectiousness may be summarized by saying that condylomas swarming with spirochetes may develop right in the middle of a course of treatment by mercury. Bismuth will sterilize but its action is much slower than that of arsenic. There are two different methods of using these drugs and each method has some very outstanding advocates. Col. Harrison of London, who has been called "that benevolent despot of British venereology," is very insistent on the advantages of the concurrent administration of arsenic and bismuth, while men like Burke of Manchester and Stokes, the leading American syphilologist, recommend and reason impressively for the use of the alternating method. Either plan will produce the desired results if followed systematically for the required length of time.

In addition to arsenic and the heavy metals mentioned, we must not forget the usefulness of the iodides. We have been accustomed to associate them with the treatment of late syphilis, but they are almost equally important in the treatment of early syphilis. The essential pathology of the lesions of syphilis in all stages is identical, consisting of an infiltration of round cells and plasma cells. The iodides prevent the encapsulation of these cells and assist in the absorption of the fibrous tissue elements in the individual lesion.

The following is an outline, in simple terms, of the irreducible minimum of treatment.

Alternating method.—Ten or twelve intravenous injections of neo-

salvarsan are given at intervals of from 3 to 5 days. This series is followed immediately by 10 or 12 intramuscular injections of bismuth given at similar intervals. Here a check Wassermann is taken and these two series are repeated without any rest period. In addition, a drachm of potassium iodide is given daily in divided doses, well diluted, for the first three weeks of the course.

Another Wassermann is taken at the end of this second course and a spinal fluid examination is made in order to make sure that the nervous system has escaped. These two double courses consume a period of 8 or 9 months and it is advisable to continue the treatment regardless of negative serological findings by another course of 8 or 10 injections of each drug, substituting mercury for bismuth, if desired. Iodides are given for another three weeks, at the beginning of this course.

Concurrent administration of bismuth and mercury.—This consists of giving an intravenous injection of arsenic and an intramuscular injection of bismuth each week for 10 or 12 weeks. Three or four weeks' rest may then be allowed, at the completion of which a blood Wassermann is taken and another course of 10 or 12 injections is given together with the iodides as described. Following the conclusion of a rest period of 4 to 6 weeks, a second blood test is taken and a spinal fluid examination is made. If these are negative a third course similar to the second one is given. Mercury may be substituted for bismuth in this last course, if desired. An icterus index and a full urinalysis should be made before treatment is started and the urine should be examined at least once a month during treatment. The patient should be instructed to report any reactions from the treatment, particularly the appearance of jaundice, or a rash, or itchy sensations in the skin.

Either of these courses as outlined, followed carefully and showing satisfactory serological and clinical results, should produce a non-elapsing arrest of the disease, which in our present knowledge we call a cure.

European practice has long indicated the tendency toward more conservative dosage. Large doses definitely endanger tolerance, burden the eliminative organs and increase complications. Massive doses cannot crush a syphilis infection; it must be gradually worn out through a long siege of less intensive therapy. It is inadvisable to exceed 0.6 grams of neosalvarsan. Women particularly, and many men do well on the repeated use of 0.45 grams.

The minimum amount of Arsphenamine necessary for the management of early syphilis is from 30 to 40 injections, providing clinical and serological response is satisfactory. The recent studies of the co-operative groups of the five leading university clinics in the United States, in conjunction with the Health Organisation of the League of Nations, show conclusively that relapse is proportional to the number

of Arsphenamine injections given. In patients with early syphilis receiving from 1 to 8 injections, relapses occurred in from 75 to 90 per cent, while it diminished to zero in a group of sero-negative dark-field positive cases receiving from 21 to 40 injections of Arsphenamine.

It is generally believed to be advisable to treat every case of early syphilis to an empiric standard, irrespective of the Wassermann test. The conception of the short abortive treatment is obsolete. A spinal fluid examination after six months of treatment is essential to evaluation of progress and duration of therapy. The adequate treatment of early syphilis then demands the long continued uninterrupted combination of arsenic and bismuth, given in conservative dosage together with periodic administration of the iodides. Anything short of this intensive treatment paves the way for relapse and the tragic late effects of uncontrolled involvement.

Control of syphilis

Having thus considered the treatment of the individual, let us now consider the extermination of the plague itself. It is the control of syphilis by treatment of the infectious person that has contributed to the declines in the incidence of syphilis, so noticeable in Europe. Stokes gives as the essentials of a program for the extinction of syphilis, the following:

(1) *Detection of the disease before the blood test becomes positive*—As only a few laboratories and very few private physicians are equipped to make the dark-field examination he recommends, the distribution of capillary tubes for obtaining the serum from the suspected sore becomes necessary. These should be forwarded at once to the Provincial Laboratory for diagnosis.

(2) *Detection of the carriers by routine tests*—The Wassermann test is fairly authentic but takes time and costs money. The new and highly efficient Kline slide precipitation test will probably soon replace it as a simplified routine.

(3) *Tracing the source of infection*—In this field the aid of the social service nursing staff will be essential.

(4) *Unwavering adherence to the Arsphenamines in the treatment of early syphilis.*

(5) *Prevention of infectious relapse*—Twenty injections each of arsenic and bismuth may be regarded as the public health minimum of treatment.

(6) *Adherence to system*—Individualization is for the late, not for early syphilis. It is expected that the Health Organisation of the League of Nations will soon propose a standard system based on world

experience with which every case of early syphilis can be treated by existing means to secure maximum preventive and curative results.

(7) *Simplification in treatment methods*—This implies a better technical training of physicians. The pain of improperly given intramuscular injections and the penalty of maladministered Arsphenamine, the essential spinal puncture poorly and rarely performed, have kept practitioners' treatment at a low level of effectiveness.

(6) *Lower costs*—Unless the patient can comfortably manage to pay for the complete course of treatment, he should be referred at once to a public clinic. His therapeutic requirements must have more weight than his financial capacity, and under no circumstances should the amount of treatment he is to receive be governed by the amount of money he has.

(9) *Centralized versus individual treatment control*—The methods of attack that are now producing reductions in the incidence of syphilis abroad are centralized. They depend upon the clinic as against the general practitioner. They are the epitome of state medicine in Great Britain. They represent socialized insurance medicine as through the *Krankenkassen* in Germany, while in Denmark every case of syphilis is registered in the Central Institute in Copenhagen, and in the Scandinavian countries there is now so little syphilis that specialists are said to be forsaking the field.

What, then, are the outstanding points in the treatment of syphilis? There are only two: *early diagnosis* and *adequate treatment*.

If the general public fully realizes how effective venereal disease prophylaxis is, how completely curable early syphilis is, how successfully the late serious and disabling manifestations of syphilis may be avoided, they will insist that those in charge of the public health awake from their lethargy and take whatever measures are necessary to ensure the realization of these very desirable results.

Incineration of Municipal Refuse*

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MODERN incineration, as connected with municipal refuse disposal, is comparatively modern. The first recorded use of this method occurred at Nottingham, England, in 1874, when Alfred Fryer, a contractor, introduced it. Two years later he built an improved furnace at Manchester. In 1896 the first large incinerator in Germany was built at Hamburg. This plant was built after the design by Horsfall, but pre-heated air by forced draft fans was introduced in preference to the steam jet method advocated by the designer. The first incinerator in the United States was designed by Lieutenant H. J. Reilly for the federal government and was erected on Governor's Island, New York harbor, in 1885. The first municipal plant was built the same year at Alleghany City, Pa. The first installation in Canada was in Toronto at the Don River in 1890. Another was built at the Western Cattle Market site some three years later. In 1906 a destructor was built at Westmount, Quebec. This plant is still in operation.

Recent figures are not available as to the number of plants in operation in the various countries, but in 1921 there were more than two hundred plants operating in Great Britain and approximately the same number in the United States. At the present time, so far as we have been able to learn, there are forty cities, towns or villages in Canada using incineration to dispose partially or completely of their combustible refuse. One other city is at present erecting a modern plant. These places are distributed by provinces as follows: Prince Edward Island, one; Nova Scotia, one; Quebec, eight; Ontario, twenty-four; Manitoba, one; Saskatchewan, three; Alberta, two; and British Columbia, one. The plant under construction is included in the two listed for Alberta.

In reviewing the history of incineration it is apparent that satisfactory results have not always been obtained. It is equally apparent that this has usually been attributed to faulty design. When the number of different designs and the number of patents connected with this process are considered, the fact that failures have occurred does not seem strange.

LOW TEMPERATURE AND HIGH TEMPERATURE INCINERATORS

Incinerators in use up to the present time may be divided into two classes, designated as low-temperature and high-temperature. The former is the one usually associated with unsatisfactory results, as the

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heat is not sufficient to destroy all the fumes produced during destruction. Poor design may also result in objectionable odors, but this is not so likely now to occur, as a better understanding of the principles of operation is general.

Incineration itself may be divided into two essential parts. The first operation is the removal of excess moisture by drying, usually accomplished by having the refuse fall first on a drying hearth. The second is the actual destruction by burning. The percentage of moisture in refuse varies widely and is dependent on many things. The ratio of household garbage to the rubbish collected is a very important factor, as garbage contains a very high percentage of moisture. This moisture content varies greatly under different conditions and its removal may result in undesirable odors. The destruction of gases given off during this drying process and the complete burning of the gases of combustion seems to have been overlooked for some time after the introduction of incineration, and this was responsible for much of the unfavorable comment regarding the process. It was not until 1890 that Col. Jones of Wrexham, England, introduced the idea of burning unconsumed hot gases. This was accomplished by an auxiliary fire over which the gases passed before entering the chimney. At the present time this is one of the primary considerations in the design of a suitable plant, but is usually accomplished by the use of what is known as a combustion chamber, which also is of material assistance in the collection of dust. This usually consists of a large chamber between the fire grates and the chimney, where the gases are thoroughly mixed and consumed at a high temperature. It has been found that, if the temperature in the combustion chamber can be maintained at not less than 1250° F., with an average temperature of not less than 1400° F., no objectionable odors will escape from the plant.

PRE-HEATING OF AIR

To assist in maintaining this high temperature it is customary to pre-heat the air introduced into the furnace for combustion. Some type of fan is usually installed to collect air from desired points inside or outside the building. This air is forced through a regenerator, usually consisting of a nest of tubes through which a part of the heated gases from the combustion chamber passes. The fresh air, in contact with these tubes, is heated and is then introduced below the fire grates. By means of a damper the quantity of heated gases passing through the regenerator is regulated, thus controlling the temperature of the heated air. This temperature is commonly from 300° F. to 400° F. Excessive temperatures in the pre-heated air tend to destroy the grates. With this arrangement we have forced draft, a feature which is sometimes obtained by using steam jets below the grates. The use of jets is more common in Europe than in America. Fans driven by electric motors

and, in a few cases, by steam are usually found in Canadian installations. Where chimneys are inadequate it may be possible to introduce induced draft by placing a fan or jet at the base of the stack. Some combination of forced and induced draft may also be employed. In some cases where the moisture content of the refuse is low, natural draft alone may be found adequate to maintain the desired temperature.

METHODS OF FEEDING

Much controversy has occurred over the various methods of placing refuse on the grates. Front and back hand-fed incinerators have had their advocates, but the most common method now in use is top-feeding. This is done either by hand or by a combination of manual power and mechanical arrangement. The smaller plants depend almost exclusively on hand-feeding, while the larger ones use some mechanical charging device. Mechanical charging was for a considerable time looked on with disfavor but this was due to the use of excessive individual charges which had a tendency to smother the fire and also to break down the grates or drying hearth upon which they fell. With the introduction of small charges this undesirable feature was overcome and mechanical charging is now employed whenever it is economically possible. The great advantage of this method is that there is very little opportunity for cold air to enter the furnace and thus reduce the temperature. This is a phase of hand-feeding impossible to overcome. Of course, with mechanical charging hand work is also required but this consists usually in raking the dried refuse from the drying hearth on to the fire and can be accomplished through a small aperture. Provision has also to be made for the removal of ashes and clinkers and this should be accomplished as quickly as possible so that the temperature of the furnace is not reduced excessively. In the larger incinerators now constructed a number of grates are built side by side with a common combustion chamber, so that the average temperature of the furnace is well maintained by cleaning or charging only one grate at a time. In small installations this is not possible, as it is more desirable to have duplicate units which afford a greater opportunity for carrying out repairs while at least a part of the plant is in operation. This feature of duplicate units should always be found in large plants as well.

With a properly designed plant, which includes the main features outlined above, there seems to be no good reason for objecting to its location in a well populated area. This is one very strong point in favor of this means of disposal. The cost of collection is high in proportion to the total cost of disposal and is influenced very materially by the length of haul. If, therefore, the disposal plant is such that it can be centrally located, a material saving can be made. Incineration has this advantage to a marked degree over other methods of disposal and is likely to receive increasing support. The inoffensive character

of the residue is another strong point in its favor and appeals particularly to health workers and sanitarians.

Considering the subject of incineration from a more practical viewpoint, *what are the desirable features in each phase of the operation from production to disposal of the final residue?*

Householder's Responsibilities

Commencing with the householder, how should he care for the garbage and refuse produced on his property? In England it is common practice to collect all kinds of refuse in one container. This is not usual on this continent when incineration is practised. At one time it was found that the ashes from the householder's furnace had a very real heating value, but this is not commonly true to-day and their introduction to an incinerator usually results in smothering the fire. The householder is, therefore, usually required to collect ashes in a separate container. A further division is sometimes made in requiring rubbish to be collected separately, but this is not common as it is usually required, particularly in the summer months, to assist in the destruction of the garbage. The householder should, therefore, have two containers, one for ashes and one for garbage and rubbish. These should be of metal, of such a size as to be easily handled, covered to prevent the entry of flies and animals and placed at a convenient point for collection at the proper time. It is a common requirement now to have all garbage wrapped in paper and this materially assists in maintaining sanitary conditions as well as assisting in the destruction of the garbage.

Collection

Collections should be made in as sanitary a way as possible. Dump carts are commonly used. They are handy, can be unloaded in very short order, are fairly convenient for loading and are easily covered by one man after loading. Whatever type of vehicle is used, it should be a convenient height for loading, easy to maintain in a sanitary condition and easy to unload. This latter feature will assist in preventing delays at the plant. As soon as loaded they should be carefully covered to prevent the escape of odors and also to prevent scattering by the wind. If the length of haul is great, it may be possible to reduce the cost of collection by having transfer stations at convenient points where the collection carts discharge their loads into large vehicles, such as motor trucks, which transfer the refuse to the disposal plant more economically. Where such transfer stations are employed, they must be so designed that they do not give offense due to the scattering of dust or the dissemination of odors. Similar precautions to those taken with the collection carts will have to be observed with the transfer vehicles.

The Plant

In order to facilitate the handling of the refuse at the plant, an effort

is usually made to take advantage of the forces of gravity. A side-hill location for the plant is ideal for this purpose, as the loads can be driven directly on to the dumping floor from which they are emptied on to the charging floor below. If the location does not permit of this arrangement, the loads may be discharged into a pit from which they are raised to the charging floor by some mechanical means. If the plant operates continuously, it will be necessary to provide sufficient storage for most of one day's burning, but there should be at least one daily clean-up when the entire plant can be thoroughly cleaned and disinfected. The charging floor and charging mechanism, where used, should be protected from the heat of the furnace. Otherwise the refuse will be subjected to a frying action which will certainly result in a foul smelling plant. The furnace itself should be strongly constructed and should contain at least the following features: a drying hearth, a sufficient grate area, adequate provision for charging and for the removal of residue, an ash pit, the necessary openings for the admission of air, a combustion chamber, and a flue connecting it to the chimney.

Most installations will be improved if, in addition to the above, they are provided with a regenerator for pre-heating the air and some means for the production of forced draft. With the use of forced draft it is possible so to arrange the suction of the fans that the plant can be kept reasonably free from dust such as is produced during clinkering operations. Provision should be made for the removal of the ashes and clinkers. In the larger plants a narrow gauge track, on which small cars with steel buckets operate, is usually provided on a level below the grates. Some of the desirable features to be found in the better class of incinerator building are as follows: hose connections where water under pressure is available; vacuum connections so that dust may be collected and removed; wash rooms and sanitary arrangements for the use of the employees; locker room, drying room, lunch room and office. The mechanical arrangement should be such that the failure of any one unit does not disrupt the operation of the plant, and instruments should be provided so that the operation of the plant may be checked at all times. It is also usual to provide means for lowering animal carcasses into the combustion chamber, where the intense heat readily destroys them.

If the plant has been properly designed and operated, the problem of maintaining suitable sanitary conditions after the refuse has passed through the fire is one of dust control only, as the residue of modern plants seldom contains more than one per cent of organic matter exclusive of carbon.

Attempts to Utilize Waste Heat

In Europe there is usually an effort made to derive some benefit from the heat produced during the incineration process. This cannot

be said to be a common practice in this country, however, nor is it true in the United States. Some exceptions to this occur and perhaps one of the best known of these is at Westmount, Quebec. In this plant, steam is produced which is used in part for the production of electricity and, during the winter months, for heating a hot pond in which snow is melted. In Outremont, Quebec, steam is produced which is used for operating an induced draft fan and for heating a garage. At Montreal West, steam is produced and is used to operate the fan supplying air to the furnace. At Winnipeg the steam produced in one of their plants is sold to a foundry, while that of the other plant is used in driving the forced draft fans. Generally speaking, attempts to obtain revenue from the incineration of municipal refuse are not very favorably considered. Special conditions such as are found at Westmount may warrant some effort being made to derive power, but generally the extra capital cost, the necessity of providing an auxiliary fuel supply, due to the lack of uniformity in the quality and quantity of refuse, and the extra equipment required offset any advantage to be gained by the use of the heat produced.

Comparison of Results in Three Canadian Plants

An interesting comparison of results obtained in three of the largest plants in Canada is obtained from the reports concerning the official test of these. The plants are (1) Wellington Street, Toronto; (2) Atwater Avenue, Montreal; and (3) Des Carrieres Street, Montreal. The comparison is set forth in Tables I, II and III.

COMPARISON OF RESULTS IN THREE CANADIAN INCINERATOR PLANTS

TABLE I

CAPITAL COST

	Wellington St. Toronto	Atwater Ave. Montreal	Des Carrieres St. Montreal
Capital Cost	\$550,000	\$400,000	\$350,000
Capital Cost per ton of Specified Capacity .	\$1,375	\$1,333	\$1,167
Capital Cost per ton of Guaranteed Capacity	\$1,146	\$1,066	\$933
Capital Cost per ton from Tested Capacity .	\$611	\$879	\$781
Man-hours per ton at Disposal Plant	0.79 hrs.	0.63 hrs.	0.653 hrs

COMPARISON OF RESULTS IN THREE CANADIAN INCINERATOR PLANTS

TABLE II

OPERATION EFFICIENCY

	Wellington St. Toronto	Atwater Ave. Montreal	Des Carrieres St. Montreal
Guaranteed Rate of Burning per square foot of Grate.....	100.0	104.1	104.1
Actual Rate of Burning per square foot of Grate.....	199.75	126.4	124.4
Maximum Temperature in any Combustion Chamber.....	2400° F.	2230° F.	2250° F.
Minimum Temperature in any Combustion Chamber.....	1400° F.	1580° F.	1350° F.
Maximum Temperature of pre-heated air—any furnace.....	425° F.	435° F.	480° F.
Minimum Temperature of pre-heated air—any furnace.....	260° F.	285° F.	280° F.

COMPARISON OF RESULTS IN THREE CANADIAN INCINERATOR PLANTS

TABLE III

PERCENTAGE CONSTITUTION OF REFUSE

	Wellington St. Toronto	Atwater Ave. Montreal	Des Carrieres St. Montreal
Percentage of Moisture in Refuse.....	51.59	53.23	39.83
Percentage of Organic Matter in Refuse ..	37.46	24.95	44.92
Percentage of Residue after Burning.....	10.95	21.82	15.25

With the increasing number of satisfactory plants in use and with other means of disposal becoming more difficult, it seems probable that much greater use of incineration will be made in the future, with the endorsement of all health authorities.



DISCUSSION

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At the outset I would like to say that this paper is very comprehensive, and is one of the best that I have had the pleasure of hearing.

Before Commissioner Harris leaves, I would like to point out that the Westmount plant was the first destructor to be built in Canada. The plants in Toronto mentioned by Mr. Harris, predated the Westmount installation, but would properly be called "incinerators," so that if Mr. Menzies changes the word "incinerator" to "destructor" his statement would be correct.

Referring to the question of "reduction." In my investigations and report to Commissioner Harris in 1911 on the disposal of garbage and refuse of the city of Toronto, I came to the conclusion that such a system cannot be made self-supporting in a city of less than a million population.

The location of an incinerator plant or destructor is a vexing question and one that is, at the present time, very much *sur le tapis* in Toronto. I am confident that, if a plant is properly designed and operated, the only real objection is of an aesthetic nature. The sight of wagons and trucks passing on the streets creates this view; and even this can be reduced to a minimum if wagons and trucks are well cared for, clean and brightly painted, the equipment polished, and the vehicles furnished with proper covers.

Two instances of imaginary complaints have come to my knowledge. In Hornsey (North London) a Fryer destructor was built, and almost immediately a "round robin" signed by several thousands of inhabitants for several miles around the plant, was presented to the Borough Council, complaining that windows could not be opened on account of dust, soot, etc., from the plant. Mr. DeCoursey-Meade, the Borough engineer, and Mr. Fryer, the designer of the plant, were called in and instructed to "do something" to obviate this nuisance. Several months later these gentlemen reported back that they had decided that a fume cremator should be built and had introduced this feature, which had been operating at a high cost for coke for a few weeks, but they pointed out in their report that, contrary to the Council's instructions, the plant had been operated during the night for several months and not a single complaint had been received. The result is obvious.

Another instance occurred in Bromley, Kent. Whenever the wind was blowing from the gas works towards the destructor, the gas manager chose that time to clean out his purifiers, and, there being rivalry between the Borough engineer and the gas works manager, the latter made it his business to circulate complaints against the destructor. The plant was shut down for complete repairs and no garbage was in, or had been delivered to the plant for several weeks. The particular wind came up, the purifiers were cleaned out, the complaints came in in due course. Naturally this objection was abandoned when the facts were made known.

These are instances which show that the objections are mainly those of imagination.

Mr. Menzies mentioned that there was danger from high temperature forced draft burning out grate bars. I do not know of any case where this could occur, and the admission of steam would be mainly to assist combustion and not for protection of grates. The application of steam for forced draft in destructors had been favoured in the early days, but due to condensation in cold weather and the contingent addition of moisture, the heated air forced draft system had become almost general. I would rather increase the height of the chimney than introduce mechanical draft equipment at the base of an incinerator stack. Such fans quickly become coated and lose their efficiency.

Mr. Menzies advocates duplicate furnaces so that burning can be continued in part of the plant while the other is under repair. This is quite easily possible in plants such as the Don and the Wellington Street plants in Toronto, and those at Descarriers and Atwater in Montreal, where there are several batteries of furnaces. In smaller town incinerators, it is my practice to divide the furnaces themselves into units, so that repairs can be made in one while the other is in operation.

Mention was made of Westmount, Outremont and Montreal West as plants producing power. Of the three, Westmount only can be considered strictly in this class. The city of London plant also develops power which is used in assisting the heating of an adjacent hospital.

The calorific value of ashes as we have them in Canada cannot compare with that of ashes collected in the old country. There they have numerous open fires burning, not very economically, soft coal, and producing ash with considerable fuel value. In Canada

the ash from slow combustion furnaces burning anthracite coal has a low fuel value, and putting this material through the incinerator furnaces merely adds to the tonnage, with no compensatory advantage beyond the additional surface for moisture absorption and evaporation. Ashes tend also to form clinker, making fire cleaning more difficult and of longer duration.

APPENDIX

- CHATHAM—Francis Hankin—2 cell—15 ton—forced draft—population 15,000.
 FORD CITY—Francis Hankin—2 cell—2 tons per hour—high temperature—forced draft—top feed (hand).
 FORT WILLIAM—R. R. Knight (City Engineer)—3 cell—50 ton—forced draft—population 25,000.
 IROQUOIS FALLS—A. H. Reid & Company—4 cell—5 ton—natural draft—population 2,000.
 KINGSTON—G. C. Wright—20 ton—natural draft—population 22,000.
 KITCHENER—Ideal Incinerator Company—3 cell—36 ton—forced draft—population 31,000.
 LONDON—Heenan & Froude—3 cell—50 ton—forced draft—population 71,000.
 NEW TORONTO—A. H. Reid & Company—6 cell—14 ton—natural draft—population 4,000 Mimico refuse burned also.
 NIAGARA FALLS—Sparks Incinerator Company—2 cell—24 tons—forced draft—population 19,000.
 OTTAWA—Heenan & Froude—75 tons—forced draft—population 135,000.
 PETERBORO—A. H. Reid & Company—20 ton—natural draft—population 23,000.
 SARNIA—Francis Hankin—2 cell—high temperature—top feed (hand)—2.5 tons per hour—population 17,000.
 SAULT STE. MARIE—A. H. Reid & Company—natural draft—population 23,000.
 SMOOTH ROCK FALLS—North America Incinerator Company—5 tons—natural draft—population 800.
 STRATFORD—A. H. Reid & Company—20 tons—natural draft—population 19,000.
 SUDBURY—Local design—1 cell—5 tons—forced draft—population 20,000.
 TIMMINS—A. H. Reid & Company—2 cell—20 tons—natural draft—population 13,000.
 TORONTO (2)—Sterling—4 and 3 furnaces—each furnace with 4 cells, continuous grate—high temperature—forced draft.
 WINDSOR—7 cells—50 tons—fuel oil draft—population 69,000.
 WALKERVILLE—Canadian Incinerator Company—1 cell—10 tons—forced draft—population 8,000.
 HALIFAX—Sterling—3 cell—50 ton—10 men collecting—4 men at incinerator.
 ST. LAMBERT—Francis Hankin—top-feed—2 cell—low temperature—forced draft—48 tons per 24 hours—cost \$19,000—population 6,000.
 LACHINE—Francis Hankin—2 cell—high temperature—forced draft—top-feed (hand)—48 tons per 24 hours—cost \$25,000—population 19,000.
 MONTREAL WEST—Decarie—1 cell—forced draft—wood-burning—cost \$6,000—population 3,000—generates steam for fan.
 OUTREMONT—Decarie—top-feed (hand)—1 cell—15 tons—usually operated at greater capacity—generates steam for heating and induced fan.
 WESTMOUNT—Meldrum—top-feed (hand)—high temperature—forced draft.
 Heenan & Froude—top-feed (hopper)—high temperature—forced draft.
 Both plants generate steam.
 MONTREAL (2)—Sterling—high temperature—forced draft—top-feed (hopper)—3 furnaces, four cells each, with continuous grate and common combustion chamber.
 THREE RIVERS—Francis Hankin—4 cell—top feed (hand)—pre-heated air—forced draft—population 39,000—capacity, 40 tons daily.
 WINNIPEG (a)—Decarie—2 unit—100 tons—hydraulic charging rams—much altered since installation in 1907.
 City Engineer's design—4 unit—80 ton—population 205,000.
 REGINA—Decarie—2 unit—110 ton—population 60,000.
 EDMONTON (under construction)—Heenan & Froude—5 cell—continuous grate—112 tons—top-feed—population 75,000.

The Role of Radiology in the Prevention of Cancer*

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THE role which radiology may occupy in the field of cancer prevention is much wider than might appear on first thought, and it comes to occupy a place of primary importance if we take a slight liberty in the interpretation which may be placed upon the word "prevention". In this way the subject may be discussed under three general headings:

- (a) Recognition and treatment of pre-malignant lesions;
- (b) Diagnosis of the early stages of cancer while successful treatment may still be possible; and
- (c) Prevention of the recurrence of cancer following its removal.

Each of these phases of the problem presents a different aspect and usually is to be attacked by a different method, but all have made very important contributions to the campaign against cancer. We shall discuss them in the order given.

RECOGNITION AND TREATMENT OF PRE-MALIGNANT DISEASES

Many of the pre-malignant diseases occur upon the skin and are very obvious. There is really very little excuse for anyone permitting such a lesion to reach a stage where it is actually malignant, and yet it is astonishing how frequently this occurs. One is also forced to the conclusion that many members of the profession either fail to recognize these lesions as pre-cancerous or else take a very casual view of the importance of cancer prophylaxis. This surely is one field in which there need be no serious disagreement.

Two comparatively common malignant lesions are rodent ulcers and epitheliomata of the skin, and both of these are preceded by some form of pre-malignant lesion in the vast majority of instances. This fact is so well known that it might be taken for granted, and yet such lesions are very frequently treated as being too trivial to bother with. From the standpoint of cancer prevention it cannot be too strongly emphasized that keratoses, senile warts and similar lesions are pre-cursors of cancer more often than otherwise and should be removed while in this stage. One is frequently called upon to answer the definite question as to whether the removal of such a lesion is actually necessary or merely advisable in a general way. The criterion is evidence of activity or its

*Presented at the 21st Annual Meeting, Canadian Public Health Association, Toronto, May, 1932.

absence. If the keratosis is known to have been present for some years without change and if the circumstances are such that it can be kept under periodic observation, we believe one may safely temporize, but if such a keratosis is increasing and from time to time coming off, or being scraped off followed by recurrence, it should be regarded as actively proliferating, and it is merely a question of time until it will cross the border line and become malignant. Under such circumstances we believe treatment is imperative if we are to fulfill our whole duty in the prevention of cancer.

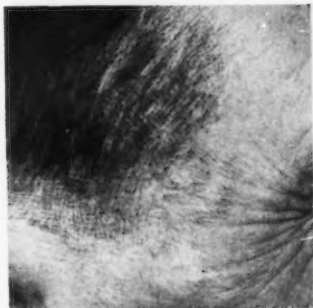
In this field radiology offers the method of first choice both from the standpoint of permanent eradication of the lesion and from that of the cosmetic result to be expected. A single application of radium or a very few exposures of suitable X-rays will remove the lesions with certainty, leaving a soft smooth skin devoid of scarring, and frequently so perfectly healed that the site of the lesion cannot be found some months after treatment.

Fortunately, cancer of the skin is a disease which is itself curable in a very high percentage of cases, and therefore neglect of such lesions is not followed by such serious consequences as in certain other situations. An error here may still be rectified by suitable treatment. But when such lesions occur at the junction points of skin and mucous membrane, they take on a vastly greater importance. Such junction points occur on the lip, at the anus and in the genital organs of both sexes. A cancer once established in any of these locations puts the patient's life at once in jeopardy and should be prevented at all costs. In this matter the medical practitioner can of course have no responsibility unless he is consulted, and we must rely upon the education of the public to bring them to us during this early stage. But too frequently the doctor first consulted treats the matter as a very trivial one requiring no treatment, or, worse still, adopts a line of treatment in which the application of irritants such as silver nitrate plays a leading part. The result is loss of time or actual stimulation of the cells and the transformation of a potential into an actual cancer.

The medical profession must assume the full responsibility for the correct recognition of these lesions which occur in a variety of forms as cracks, fissures, tiny areas of superficial ulceration, keratoses, etc. If any of these occur in the localities mentioned and fail to respond in a reasonable time to simple remedies they should be treated. In this field again we believe radiological methods have the most to offer and in the pre-malignant stage, treatment should be followed by a perfect cure in almost 100 per cent of cases. Those which fail are usually already malignant and probably fail because of inadequate treatment.

We have left the subject of moles for separate consideration because of its importance.

These lesions are of two main varieties. "First, the pigmented mole (naevus pigmentosis) a benign or harmless lesion, usually flat or wart-



Early Epithelioma before and after single application of radium.



(Before)

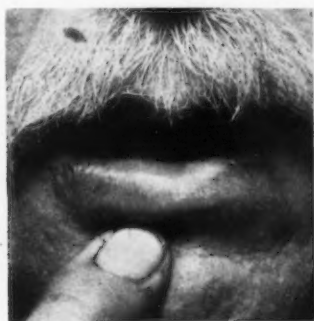


(After)

Epidermoid Carcinoma, very small lesion of the rather resistant type. Requires a heavier dose of radium.



(Before)



(After)

Pre-epitheliomatous lesion on the lip. Treatment leaves no visible scarring and is almost uniformly successful.

like, or occasionally a papillary excrescence, and second, the malignant melanoma (melanosarcoma), the most dangerous of all neoplasms afflicting the human body."¹

Chronic irritation of the first by any one of a variety of causes, including trauma, may transform the first into the second form, leading to a rapidly fatal outcome.

The scope of the present paper does not include a discussion of the treatment of the malignant variety except for the purpose of drawing attention to the urgent importance of prevention where that is possible. The surgical treatment of malignant moles is still taught and practised in spite of the fact that it seldom cures the disease. Of 200 cases of malignant moles operated upon by Bloodgood during a period of thirty years, there was only one case who survived the five-year period and this patient received post-operative X-ray therapy. Of 38 cases operated upon at the Mayo clinic, only one survived five years.

If the results of surgical treatment are so poor when the disease is established, it is most important that the treatment of the non-malignant stages be correct. It has been taught that the excision of these lesions is safe and adequate. Such excision may be sufficient if done widely, as advocated by Handly and others, but there is ample evidence to indicate that, as commonly practised, excision of pigmented moles is extremely dangerous, is sometimes followed by local recurrence and occasionally by wide-spread dissemination and death. The prevailing practice of locally excising the lesion and then referring the patient for post-operative X-ray therapy is unfair to the radiologist, as it then throws entirely upon him the onus of preventing recurrence. The radiological treatment of these lesions is itself entirely adequate to deal with them and the excision therefore introduces an unnecessary traumatism, and possibility of stimulation. The method used consists in what Evans has called a "hyper-massive" dose of unfiltered X-rays in which 100-125 M.A. mins. is given at one dose without a filter (62 K.V.P.; no filter; 28 cm. distance; 5 m.a.; 20-25 minutes). If the lesion is situated where scarring is not likely to be too disfiguring, the mole may be destroyed by electro-dessication followed by a heavy dose of unfiltered X-rays.

In either case biopsy is considered unsafe and is never undertaken.

The treatment of true melanotic moles by radium is considered an unsafe procedure unless it is preceded by complete and thorough dessication or electro-coagulation, regardless of subsequent scarring. Anyone who has witnessed the tragic consequences following upon less radical or at least less effective measures will have no difficulty in agreeing that these lesions must be regarded with the utmost respect and treatment must be prompt, efficient and radical to be successful.

¹Evans and Leucutia, *J. Am. Roentgen Ray Soc.*, August, 1931.



Typical pre-malignant lesion.. Easily cured by radium in this stage.



Melanotic mole. Treated by electro-coagulation followed by radium. Satisfactory healing, with considerable scarring. Less radical measures are considered too dangerous to be justifiable.



Early rodent ulcer healed by radium with very slight scarring. The location is somewhat unusual for this lesion.

Leukoplakia

Of the pre-cancerous lesions affecting the oral cavity leukoplakia is one of the commonest and, if our experience is any guide, is quite prevalent. As is well known, it occurs usually in men and in smokers much more frequently than in non-smokers.

One finds in the literature statements that leukoplakia does not respond to radium, which is quite contrary to our experience.

The disease varies all the way from slight milky areas in the mucous membrane with no suggestion of ulceration to fulminating cases resembling Vincent's angina from which multiple sections show epithelioma throughout the mouth. Of these we have seen three in the past five years, one such case being illustrated (page 35).

The radiological treatment of leukoplakia is almost exclusively radium therapy, as X-rays cannot be accurately applied within the mouth. In the ordinary case, the treatment is applied by means of a wax mould fitted over the area so as to completely cover all of the involved tissue, and into this mould the radium needles are embedded. It has been our experience that it is much better to deliver a dose sufficient to cause a cyto-necrosis of the superficial mucosa to be followed by complete desquamation of this layer of tissue. The reaction is moderately painful when it is at its height, but soon subsides, and heals leaving a perfectly new and healthy layer of mucosa. In favourable cases, one or two treatments is all that is necessary. In more difficult ones, areas of ulceration may be present which will not respond to this dose of radium, and in these cases, electro-desiccation is recommended. This may be carried out under local anaesthesia without difficulty, and when combined with further doses of radium is usually sufficient.

In the fulminating type, the treatment is protracted and difficult, and the case will require supervision for almost an indefinite period following treatment. Multiple areas of epitheliomatous formation are commonly present, and the treatment required is both widespread and radical. This must be combined with complete mouth hygiene, with removal of all septic teeth, and treatment if syphilitic disease is present. By this means, however, few cases of leukoplakia should remain uncured providing the patient is willing to co-operate fully in the measure to be adopted.

Pre-epitheliomatous Ulcers Within the Mouth

Attention should be directed to small areas of ulceration within the oral cavity generally, very similar to those to which attention has been called on the lip and elsewhere. The presence of a positive Wassermann frequently complicates these cases, and is responsible for much loss of



Case of fulminating Leukoplakia proved by biopsy, referred to in the text. Extensive lesion associated with multiple areas of ulceration and very gross oral sepsis. Positive Wassermann.



Previous case following a single treatment by radium. Most of the ulceration has healed and subsequent healing took place very perfectly.

valuable time. As on the lip and elsewhere, any ulceration within the mouth which does not heal shortly should be regarded either as syphilitic or malignant and the presence of a positive Wassermann should not be permitted to delay the taking of a section, if the patient is in middle life or later. The profession can scarcely be excused for failure to recognize such lesions during the early stage, as this is the only period at which a high hope of cure can be held out to the patient. By the time glands are palpable, the case has already progressed into the group of advanced cancers in which possibility of cure has rapidly diminished.

The treatment of such areas of ulceration within the mouth consists in a very careful mouth hygiene with a cleaning up or removal of all suspected teeth; appropriate treatment in the presence of a positive Wassermann; and finally the application of radium to the local lesion. If the biopsy has shown it to be malignant, this should take the form of an intensive dose and will result in curing at least 75 per cent of such lesions. It is difficult to see how the patient can be expected to forgive a medical attendant, in whom he has reposed his confidence, who continues to treat such a lesion by means of simple mouth washes and some internal medication for weeks or months until regional glands have made their appearance and the disease has progressed from an early curable pre-malignant condition into an actively growing and fully established cancer with glandular involvement in which the possibility of cure is greatly reduced.

Radiological Diagnosis of Some Obscure Pre-malignant Disease

The above paragraphs have referred to the treatment, by radiological means, of a number of diseases, the recognition of which may be made by ordinary methods of diagnosis. The next group to which we would direct attention includes a group of diseases whose recognition is possible only by means of radiological methods of diagnosis. It is not necessary to take time in pointing out the value of X-ray examination of the teeth and jaws for discovery of retained root fragments or small areas of necrosis in the jaws which occasionally become malignant. This is well known, and is probably a rather infrequent cause of cancer.

By means of the bismuth meal, we are in possession of means of exploring the stomach and duodenum with great accuracy. By this means, the recognition of ulcers of the stomach of such a size that development into carcinoma is imminent may be accomplished in the majority of cases in which this disease is present. In the stomach and also throughout the colon a diagnosis of polyposis can be made. The importance of discovery of polyposis in the colon is emphasized when it is remembered that 40 per cent of these cases later become malignant. This is an extremely high percentage and is considered justification for radical surgical treatment.

Diverticulitis

Similarly in the case of diverticulitis, the most accurate means of recognition consists in X-ray studies of the colon. While the figures show that only a small percentage of these cases become malignant, yet the disease may be regarded as one of the pre-malignant group, in which the diagnosis depends upon radiological methods.

DIAGNOSIS OF THE EARLY STAGE OF MALIGNANT DISEASE

In the second place, radiological methods place in our hands a means of very early recognition of certain types of malignant disease throughout the body in situations in which this could not otherwise be accomplished until the disease had progressed far beyond the early stage. A few of these may be referred to.

Carcinoma of the oesophagus. The frequency of carcinoma of the oesophagus is not commonly recognized. This disease is one of the most hopeless of all forms of carcinoma, and accounts for 13 per cent of all deaths from carcinoma, standing in this respect fourth place in carcinoma generally. Any progress which may be expected depends upon its very early recognition. This may usually be accomplished only by the most painstaking study of the oesophagus by means of the opaque meal, and this should be undertaken in the case of any individual of middle life or later who complains of difficulty in swallowing. If this difficulty is progressive, the indication is all the more urgent. At the present time, the only cures which are being reported in carcinoma of the oesophagus occur in the upper end, at the introitus or immediately below it.

Carcinoma of the stomach. It is abundantly clear that in carcinoma of the stomach, the only hope of cure depends upon its early recognition and prompt surgical treatment. Unfortunately, the percentage of cases in which this is possible remains small, and probably will continue to do so, and the tragic fact remains that when carcinoma of the stomach is discovered it is usually too far advanced for successful cure by resection. This, however, should only stimulate us to greater efforts to discover ways and means of recognizing the earliest possible symptoms and investigating such cases most carefully. The clinical symptom which has seemed to be most constant in our experience has been progressive loss of strength in individuals, usually men, at middle life or later. As this is accompanied by slight symptoms of indigestion, it is a clear indication for careful investigation and study. In cases which are fortunate enough to be recognized in the very early stage, successful resection may be accomplished, and numerous cases are on record where this has been followed by permanent cure. Up to the present, neither X-ray nor radium treatment has seemed to be effective in the treatment of carcinoma of the stomach except in the very late stages, as a palliative procedure, and we believe has no place at this stage of the disease.

Carcinoma of the colon and the upper portion of the rectum, are almost entirely dependent upon radiological methods for their early recognition. An occasional carcinoma of the rectum may be recognized at a very early stage by other means, but much reliance must be placed upon a careful X-ray study for early diagnosis in this location. In the lower portion of the rectum the ordinary methods of examination are superior and will always remain so for purely technical reasons. The passing of blood from the rectum should always lead to a careful physical examination and if the lesion is not found, should lead immediately to a barium enema in order to discover the possible presence of a neoplasm. As in the stomach, the treatment is purely surgical, and the field of radiology consists in early recognition of the growth at a time which permits of successful removal.

Tumours of Bone

Practically the only means at our disposal permitting the early recognition of malignant diseases of bone consists in examination by means of X-rays. Making full allowance for the fact that in the very early stage of such diseases, the differential diagnosis presents difficulty, yet the fact remains that by making full use of this method we should be able to recognize such malignant tumours earlier than by any other means. If this is to be accomplished it will be necessary to examine any case in which a swelling is discovered in relation to a bony structure, or in any case in which persistent pain is complained of in any bony part of the body. By this means periosteal sarcoma of bone, Ewing's tumour, etc., may be recognized in the early stage and suitable treatment instituted. In giant-cell tumour of bone the disease will probably be always fairly well established before it will be recognized and as this is one of the more benign tumours, the progress is probably not materially altered by earlier recognition. The difficulties in the way of accurate recognition of pre-malignant conditions and border-line states in bone pathology is greater than in most of the other radiological problems, and in many such cases repeated examinations at intervals may be necessary in order to obtain accuracy, but by this means some further improvement in the results of treatment of bone tumours should be possible.

THE PREVENTION OF THE RECURRENCE OF CANCER

Almost equal in importance to the prevention of cancer in the first place is the prevention of its recurrence following removal either by radiological or surgical methods. This problem is perhaps of most importance in connection with cancer of the female breast. In our attempt to discover the best possible means of dealing with this disease we have, at our disposal, a number of methods or combination of

methods of treatment. First there is the surgical operation alone without the addition of any form of irradiation either before or after the operation. If the disease is limited to the breast and no glandular involvement is present, the percentage of cures is high and irradiation probably does not very materially alter the percentage of five-year survivals.

In the group in which glandular involvement is present, surgical treatment alone in one group of seventy-five cases in which the records were carefully kept showed percentages, alive and free from symptoms varying from fifteen to twenty-five per cent. In the same clinic the operation followed by post-operative irradiation resulted in twenty-nine per cent alive and free from symptoms at the end of five years, while a combination of pre-operative radiation with post-operative radiation produced forty per cent of five-year survivals. It is interesting to express this in a slightly different form, namely, the average length of life after the first manifestation of the disease in cases dying of cancer of the breast which have been treated by a variety of methods of treatment. In such cases those receiving no treatment at all live thirty-one months. Those who were operated upon but did not receive any form of radiation therapy lived thirty-nine months. Those who were operated upon and received only post-operative irradiation lived forty-nine months. While those who received some form of irradiation *both before and after the operation* lived sixty-one months. One of the immediate results of adequate and successful post-operative irradiation in cancer of the breast is likely to lead to a great deal of misunderstanding on the part of the public and the profession as well unless it is fairly understood. This is the fact that in cases in which adequate irradiation has been carried out local recurrences are usually prevented, but the distant metastases are not affected and the patient's life is prolonged until these develop and the normal termination of such a case is death from distant metastases. Forsell states that local recurrences after surgical interference appear in the operation field in fifty-five per cent of the cases who had recurrences, while after combined surgical radiological treatment local recurrences appeared only in thirty-four per cent.

It is pointed out that the above figures refer only to patients who have succumbed to the disease as being better illustrations of the point we wish to emphasize. The percentage of patients who survive without recurrence is more impressive still, and there has now accumulated a vast literature on this subject. It is sufficient for the present purpose to state that the percentage of recurrences is reduced almost 50 per cent by suitable post-operative X-ray treatment.

The field for such measures covers almost the entire range of the subject of cancer and there are but few cases in which benefit and prolongation of life in some degree may not be obtained by this addition to the standard surgical treatment.

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EARLY DIAGNOSIS OF CANCER

PROGRESS in the control of cancer depends to a large extent on early diagnosis. This in turn depends on the education of the public and the keenness and skill of the general practitioner who is the first to see the individual case. In the early days of cancer publicity there was danger of cancerophobia. As in the case of consumption thirty years ago, people had an intense fear of cancer, and public discussion of the subject seemed to increase this fear. Considerable experience in addressing audiences of women on the subject of cancer has satisfied the writer that discussion of the ordinary facts about the disease no longer creates fear. There is no danger of cancerophobia to-day. Cancer education is a safe procedure.

Danger lies in delay. It is well known that even in cancer of the face and other parts of the surface of the body, the average period of delay in seeking advice is six and one-half months. Unnecessary delay on the part of the patient is one of the great barriers to early diagnosis. Any fear of cancer should be replaced by the fear of delay.

Biopsy in cancer is imperative. An absolute clinical diagnosis of cancer is possible in only about seventy per cent of the cases. The present intensive educational campaign against cancer is bound to bring people to their doctors with many lesions impossible of clinical diagnosis. There will, in the near future, be greater dependence on the use of the microscope. The need of biopsy will become increasingly frequent. This aid to diagnosis is not infallible; it is, however, the most reliable auxiliary we have. Here and there it will be opposed because of the real or assumed danger of disseminating cancer cells. The preponderance of authority favours biopsy as a most valuable aid to diagnosis in cancer.

Doctors should teach their patients to come for regular periodic examination, as is taught by dentists. Such an examination must be thorough, and in women should include a pelvic examination. The patient who has discovered a lump in her breast should visit her

family doctor *at once* and *insist* upon a definite opinion. The doctor may be unable to give an immediate diagnosis. Under such circumstances he should remove a minute portion of the growth under a local or a general anaesthetic, and be prepared for radical operation if the pathologist's opinion indicates malignancy. Unfortunately, in such cases as this the hesitation of the patient to visit her doctor is often supplemented by the hesitation of the doctor to act. However much excuse there may be for the delay of a patient more or less ignorant of the danger, there is no excuse for delay on the part of the physician. He must act, not to-morrow or next week, but at once! Early diagnosis in cancer is true prevention.

J. W. S. McCULLOUGH.

A YEAR OF ACHIEVEMENT

WE are often too prone to delay recording our achievements until they are mere memories. We feel that becoming retrospective implies that we have passed out of those actively doing to those passively reviewing. This attitude of mind is wrong: a regular auditing of efforts before they become of historical interest only tends to a more prompt appreciation of our shortcomings and successes, either in terms of programmes or people. Such stocktaking should act as a stimulus to present and future effort.

Looking back on the year just concluded we note, first, that, despite the appreciable falling off in the financial support from advertising, the standard of the JOURNAL was maintained at the same high level set by the Editorial Board a few years ago. It is most encouraging to find that the circulation of the JOURNAL has steadily increased until it is now second only to the Journal of the Canadian Medical Association in this respect.

The annual meeting in May was the high light in C.P.H.A. conventions, not only as regards attendance and programme, but in enthusiasm and interest. Both quantitatively and qualitatively the attendance surpassed that of any previous convention. The scientific programme would have been difficult of improvement. The commercial and educational exhibits added materially to the interest. Then too, the winter session of the Laboratory section, held in Toronto on December 28th, must be considered a real achievement.

No reference to 1932 would be complete without commenting on the contributions made by the Hon. Dr. Robb, Minister of Health, who as Honorary President gave most generously of his time and counsel to the affairs of the Association, and by Dr. W. J. Bell, to whose leadership and enthusiasm as President the success of the Association in this difficult year is so largely due.

The Association enters 1933 immeasurably encouraged by the achievements of the past year.

PUBLIC HEALTH NURSING

A Recent Gift for a Nursing School

E. KATHLEEN RUSSELL, B.A. (Kings.), B.PAED.

Director of the Department of Public Health Nursing, University of Toronto.

A GENEROUS gift from the Rockefeller Foundation makes possible the re-organization of the work now being done in the Department of Public Health Nursing of the University of Toronto, and also the courses for hospital staff nurses which are being offered at present by the Department of Extension in the same university. The work of these two departments will now be brought together in a School of Nursing, in which both undergraduate and graduate courses will be offered.

The new school will be housed in the building at No. 7 Queen's Park, which until last year was used as a women's residence of University College. The Government is having this building renovated so that it will provide accommodation for both teaching and residential purposes.

One special responsibility that has been undertaken is to provide a direct and straight-forward training for public health nursing. Preliminary studies on this matter are leading to the conclusion that it will be possible to arrange a general practitioner's course in nursing that will fit the nurse for general duty—i.e., the junior posts—in both hospital nursing and public health nursing. It is hoped that the content of such a course may be simplified so that it will be reasonably short in length—probably 3 years. The school is not interesting itself in especially lengthy or expensive

forms of training, but wishes rather to make a special study of what might be called the primary stage of nursing education.

Plans are being made to continue for a time to offer the present one year courses for *graduate* nurses who wish to prepare in this manner for public health nursing or for hospital staff work. Later, as some of the content of these so-called postgraduate courses finds itself in the undergraduates' course, true postgraduate work will be inaugurated.

The new school is arranging for close affiliation with the nursing schools of several of the Toronto hospitals so that its pupils may have the fullest opportunity for training in bedside nursing. Other affiliations with local and provincial public health organizations will give the opportunity for training in district work. The difference between this school and other schools for nurses is that this one will be independent financially. Working on this basis, it may be found possible to give more direct consideration to the pupil nurse and the needs of her training. With special resources for its work, the school hopes to be able to help towards the solution of some of the most pressing problems that have accumulated around our nursing schools in their very rapid growth of the last few years.

EPIDEMIOLOGY AND VITAL STATISTICS

Typhoid Fever in North York Township

C. E. HILL, M. D.

Medical Officer of Health, North York Township.

THE township of North York lies adjacent to the city of Toronto and York Township and is a suburban area, with some farms. The township is supplied with a treated water supply, and most of the milk supplied to residents of the township is from Toronto dairies and local pasteurization plants, but there is no by-law providing that all milk sold in the township shall be pasteurized. However, approximately 95 per cent of the milk sold in the township is pasteurized.

On June 22nd and 23rd, 1932, two cases of typhoid fever were reported to the Medical Officer of Health. Immediately upon receipt of this information, details with respect to these two cases were obtained, using the "Investigation Form for Typhoid Fever" as supplied by the Department of Health of Ontario. It was found that the only common article used by the two cases, who lived a quarter of a mile apart, was their milk supply, which was obtained from a neighbour. This milk was unpasteurized.

When this fact was brought to light, an investigation was made at the household of the vendor who supplied the milk to the two households in which the cases of typhoid fever had developed. The vendor's household consisted of three individuals, all adults—two males and one female. On careful questioning, it was found that all three had suffered an attack of typhoid fever in 1900, which they considered to have been caused by drinking contaminated water while away from home attending a threshing. The three were brothers and sister. The sister had been in bed for four weeks at that time, and had made an uneventful recovery. She had

taken full charge of the milk, and the sale of the milk. They kept one cow, and had done so for years.

Samples of whole blood were taken from all three for agglutination and blood culture. None of them showed any agglutination to typhoid, paratyphoid A. or B., B. abortus or B. tularensis, and all blood cultures were sterile. A sample of urine and feces was also obtained from all three. The brothers' specimens failed to show the presence of typhoid bacillus, but that of the sister showed the presence of typhoid bacillus in abundance. A sample of milk obtained for bacteriological examination showed a bacterial count of 170,000 per c.c.

The two individuals who had contracted typhoid were treated in hospital. The mother of one case had departed while he was in the incubation period to take a position as salad cook in a large hotel in Northern Ontario. The physician at the hotel was informed, and he reported that specimens of urine and feces, as well as observations for the early signs of typhoid, were all negative.

When it was found that the sister of the household from which the milk was supplied was the typhoid carrier, further questioning elicited the following facts: A nephew of these three individuals contracted typhoid fever in 1918, while visiting the household. In August, 1918, a sister from British Columbia visited the household, developed typhoid and died in the hospital three months later. A brother who had visited the household died of typhoid in 1929.

The action taken by the Medical Officer of Health was:

1. No milk was allowed to be sold by this vendor as soon as it was

suspected that this was the route of infection.

2. The milk vendor was induced to sell the cow, and retire from the milk business.
3. The woman who was found to be a carrier was advised of the necessity of taking precautions to prevent the spread of the infection.
4. The privy on the premises was cleaned out by the township authorities, and made fly-proof.

Although this outbreak amounted only to two cases, one can foresee what would have happened if this particular vendor had been in the milk business on a larger scale, and sold milk to a greater number of customers. It should be one more argument for the efficient pasteurization of all milk, and is reported for this reason. Another interesting fact is that the blood samples showed no agglutination to the typhoid bacillus.

REPORTED CASES OF CERTAIN COMMUNICABLE DISEASES IN CANADA* BY PROVINCES

NOVEMBER, 1932

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria.....	3	12	29	147	126	25	15	6	4
Scarlet Fever...	1	22	27	263	240	82	49	17	68
Measles.....	—	7	33	307	997	61	3	92	63
Whooping Cough.....	—	3	—	442	324	138	19	5	91
German Measles	—	—	—	17	23	†	1	5	5
Mumps.....	—	—	2	48	308	35	8	1	17
Smallpox.....	—	—	—	—	—	—	—	1	—
Cerebrospinal Meningitis...	—	—	—	4	1	—	—	—	1
Anterior Poliomyelitis	—	—	3	24	21	1	—	4	1
Typhoid Fever...	3	2	20	64	42	28	9	8	3
Trachoma.....	—	—	—	—	—	2	—	—	5

DECEMBER, 1932

Diseases	P.E.I.	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Diphtheria.....	2	9	23	113	81	29	25	8	6
Scarlet Fever...	1	37	61	300	362	104	77	28	63
Measles.....	—	24	69	186	2334	9	5	55	55
Whooping Cough.....	—	5	—	388	374	135	40	3	97
German Measles	—	—	—	12	25	1	—	—	3
Mumps.....	—	28	—	61	563	69	8	—	20
Smallpox.....	—	—	—	—	13	—	3	—	—
Cerebrospinal Meningitis...	—	—	—	4	1	—	1	—	—
Anterior Poliomyelitis	—	—	1	4	1	—	—	—	—
Typhoid Fever...	2	—	9	31	12	11	16	—	3
Trachoma.....	—	—	—	—	—	6	—	—	11

*Data furnished by the Dominion Bureau of Statistics, Ottawa.

†Not reportable.

CORRESPONDENCE

Trachoma in Saskatchewan

To the Editor:

In connection with the abstract of Dr. Byers' article on trachoma in the November issue of the JOURNAL, I am pleased to be able to state that the number of cases of this disease among the non-Indian Saskatchewan population is now about four hundred.

T. DOUGLAS KENDRICK,
M.B., D.P.H.,
Department of Public Health,
Regina, Saskatchewan.

December 16, 1932.

Extermination of Bed Bugs

To the Editor:

Many times in the last fifteen years of medical practice, I have been asked by women of various social ranks, and particularly by those living in unpainted lumber and log houses, what was the best way to get rid of bed bugs.

The many text-books on medicine suggest the use of gasoline, benzine, kerosene or fumigation with hydrocyanic acid gas, sulphur dioxide or carbon bisulphide. Several of these women, after using either gasoline, benzine, etcetera, or fumigation with the gases suggested, told me, to my dismay, that none of these methods would exterminate the bed bugs in their homes.

Then I began a study of the habits of bed bugs to try to find a way of exterminating them from unpainted lumber and log houses. In such homes, bed bugs flourish best, as they have there numberless hiding places. It is practically impossible to find and kill every bed bug by the use of gasoline, etcetera, for they hide so effectively in the cracks of the lumber and logs of the house. They also hide any place out of sight in the day time. As for fumigation by means of any of the gases suggested, these homes are not built snugly enough to get and maintain sufficient concentration of the

gas used to kill every bug.

The bed bug travels and feeds only in the night. His food is human blood. The eggs are laid and hatched only in the bed, and especially in the creases of the mattress. The natural body heat of the occupant of the bed, together with the summer and stove heat, is the incubator.

Now if the housewife in such a home will pull the bed away from the walls about 8 inches, many of the bed bugs in the walls and ceiling will starve to death, for they must find sooner or later human blood to eat. All bed bugs in vacated houses starve to death. Some will crawl up the bed legs to their human meal, and many more will drop from the ceiling down to the bed in their search for food. Then the woman must take 4 ounces of insect powder per bed and dust this into the pillows, bed clothing and, most important of all, into the creases of the mattress. Do not shake the pillows or bed clothing, and do not turn the mattress over. There will not be one living bug in the bed in ten days, and no eggs laid either. Old and newly hatched bed bugs will all be dead, provided people continue to sleep in the bed thus treated. Bed bugs must find human blood to eat, and will go only where it is, while human heat will be necessary to incubate the eggs already laid. Once these eggs are hatched, they, too, will be poisoned. The insect powder, no matter how thick, will not in any way poison the sleeper in the bug-infested bed.

It will be necessary to continue this treatment for about 30 days, for all living bugs in the walls, ceilings, etcetera, must find the occupied bed in their search for food. Otherwise, they must starve to death. When they find the bed thus treated, they too will be poisoned.

D. W. GANTON, M.D.,
Henribourg, Saskatchewan.

January 9, 1933.

NEWS NOTES

Annual Meeting, Canadian Public Health Association

AT a meeting of the Executive Committee of the Canadian Public Health Association in November, definite decision was made to hold the 22nd annual meeting of the Association in St. John, N.B., on June 20, 21 and 22. The Canadian Medical Association is meeting in St. John during the same week and certain joint meetings are being planned. Dr. Wm. Warwick, Deputy Minister of Health for New Brunswick and President of the Canadian Public Health Association, with a local committee, is directing the arrangements for the meeting.

Laboratory Section Meeting

THE midwinter meeting of the Laboratory Section of the Canadian Public Health Association which was held on December 28th in the Royal York Hotel, Toronto, was an outstanding success. Both morning and afternoon sessions were well attended and more than seventy were registered. Dr. W. J. Bell, Deputy Minister of Health for Ontario, and President of the Association, addressed the members at a luncheon session, stressing the place of the laboratory in public health work. At the afternoon session Surgeon M. V. Veldee of the United States Public Health Service, Washington, as guest speaker outlined the present status of scarlet fever toxoid in the prevention of scarlet fever. At the two sessions eight papers, several of which will appear later in the JOURNAL, were presented, while a number of demonstrations were a feature of added interest. Members were present from each of the universities in Ontario and from a number of cities in the same province. British Columbia, Alberta and New Brunswick were also represented. Among those present from out of town were Miss Ida F. MacLachlan, Dr. J. H. Orr, Dr. Wm. D. Hay and Mr. Gardiner from Kingston;

Dr. G. M. Little and Dr. W. G. Saunders, of Viking, Alberta; Dr. J. G. McCammon, New Westminster, B.C.; Dr. C. W. MacMillan, St. John; Dr. Nelson Graham, Sault Ste. Marie; Dr. G. G. Holdt, of the United States Public Health Service, Washington; Dr. A. J. Slack, London; Prof. D. B. Shutt, Guelph; Dr. F. S. Parney, Ottawa; Dr. J. W. Bell, Ft. William; Dr. C. B. Waite, Peterborough; Dr. W. J. Deadman, Hamilton; Dr. W. A. R. Michell, North Bay; and Dr. F. L. Letts, Ottawa.

Annual Meeting of the National Tuberculosis Association

THE National Tuberculosis Association will hold its annual meeting in Toronto during the week of June 26, 1933. This is the first occasion on which the Association, founded in 1904, has met outside the United States. Among the outstanding speakers from England will be Sir Humphrey Rolleston and Dr. Stanley Griffiths.

British Columbia

DR. A. SCHWARZMAN has been appointed Medical Officer for Tofino, succeeding Dr. D. S. Dixon, deceased; and Dr. A. E. H. Bennett has succeeded Dr. P. P. Smythe as Medical Health Officer for Ocean Falls.

The *Bulletin* of the British Columbia Board of Health has published in the November and January numbers two articles on the presentation of medical papers, with valuable notes on public speaking. These were contributed by Dr. H. W. Hill and are of great value to physicians and particularly to health officers.

Manitoba

A SURVEY of the cost of medical services in Manitoba for the year 1929, undertaken by a committee of the College of Physicians and Surgeons and the Manitoba Medical Asso-

ciation, has now been published. The total expenditure for medical services amounted to \$10,220,536. In addition, free work was contributed by physicians to the amount of \$1,301,607. Of the total work done by practitioners, approximately 72 per cent was paid for, 18 per cent was charity work, and 10 per cent additional free work in hospitals. The figures represent the conditions of 1929 and do not give a true picture of average conditions. It shows strikingly the volume of service rendered to the public by the profession.

Dr. E. W. Montgomery, late Minister of Health and Public Welfare, has been appointed Chairman of the Board of Health, with supervision of hospitals.

The third series of radio talks by the Department of Health and Public Welfare which commenced in November, is being continued during the spring months. The talks are given every Tuesday and Friday from 12.50 to 1 p.m., and the last three minutes are devoted to a question and answer period. Copies of the talks will be available from the Director of the Health Education Service, Department of Health, when the series is completed.

Ontario

THE 19th Annual Meeting of the Ontario Health Officers' Association will be held in the Royal York Hotel, Toronto, May 16, 17 and 18, 1933, in conjunction with the meeting of the Ontario Dental Association. Two joint sessions have already been arranged. The officers of the Association for 1933 are: President, Dr. J. W. Fraser, M.O.H., Kitchener; First Vice-President, Dr. J. J. McCann, M.O.H., Renfrew; Second Vice-President, Dr. Ward Woolner, M.O.H., Ayr; and Secretary, Miss Mary Power, Director of the Division of Health Education, Ontario Department of Health.

Recent announcement has been made of the election of Dr. J. G. FitzGerald as Third Vice-President of the Health Committee of the League of Nations.

Colonel Lorne Drum, C.B.E., M.D., has been appointed Director-General and Chief Executive of the St. John Ambulance Association in Canada, succeeding Colonel Charles A. Hodgetts, M.D., C.M.G., who recently resigned after many years of valuable service. Dr. Hodgetts made a great contribution to the Association and Colonel Drum is a worthy successor.

In the death of Dr. Stuart Scott, of Newmarket, Ontario lost a physician who had been not only an outstanding practitioner, but a prominent health officer. Dr. J. H. Wesley has been appointed to succeed Dr. Scott as Medical Officer of Health.

The Ontario Committee for Safe Milk, through the co-operation of the Metropolitan Life Insurance Company, Ottawa, has issued the following four pamphlets: *Pasteurization, Eight Reasons for Making Pasteurization of Milk Effective, Should Pasteurization of Milk Be Universal?* and *Safe Milk for the Country Home and the Summer Cottage*. These articles have been prepared by a committee of experts and will be of great value to municipalities in campaigns for safe milk. Copies may be obtained from the head office of the Metropolitan Life Insurance Company, Ottawa.

Quebec

THE seventeenth annual clinical session of the American College of Physicians will be held in Montreal from February 6th to 10th, inclusive, with the Windsor Hotel as headquarters.

Dr. J. E. Sylvestre, D.P.H., formerly Medical Officer of the County Health Unit of Lévis, has been appointed Inspector of Health Units in the Provincial Bureau of Health.

Nova Scotia

ON November 22nd the new annex to the City of Sydney Hospital was formally opened by the Hon. G. H. Murphy, Minister of Health. The need for provision for tuberculosis cases in this section has long been recognized. For more than thirty years Dr. J. Knox McLeod of Sydney has urged adequate provision. It was

a great satisfaction, therefore, to Dr. McLeod and other physicians associated with him to see the achievement of their efforts. Great credit was due to the Council for their courage in carrying out the scheme in the present difficult time. The annex was made possible by the generous support of the Provincial Department.

BOOKS AND REPORTS

Sanitation of Water Supplies.

By Murray P. Horwood, Ph.D., associate professor in the Department of Biology and Public Health, Massachusetts Institute of Technology. Publisher, Charles C. Thomas, 220 East Monroe Street, Springfield, Illinois, 1932. 181 pages. Price \$3.00 postpaid.

This book is somewhat different from most text books devoted to water supplies. The author points out it has been designed as a text for students in municipal sanitation and public health. For this purpose it no doubt will be of value. It does not introduce any extensive new material, but the author has compiled a good deal of valuable information for the use of students. The book cannot be regarded as a valuable engineering text, although an attempt is made to treat a number of purely engineering features in connection with water supplies.

The author has divided his subject material into ten chapters. The first is devoted to "Municipal Sanitation and Public Health" and in it he describes the rise of this development and the different phases through

which it has passed. He emphasizes the important position of municipal sanitation in community life. Three chapters are devoted to the development of water supplies, their source, use and the requirements for potable water. This is a condensed summary of pertinent information on this phase of the subject. Quotations from other publications are made use of.

One chapter is devoted to water-borne diseases. Statistics are quoted and information given as to how water may become contaminated. Since this is well established data, little new material is contained in this chapter. A considerable portion of the book is devoted to the treatment of water. This includes water softening, slow sand filtration, rapid sand filtration and disinfection, as well as miscellaneous methods of taste and other improvements to water. The space allotted permits only a statement of the general principles. This, of course, is what the student in public health desires, and the book consequently serves the purpose that the author states in his preface. It is printed on excellent paper and is well illustrated.

A.E.B.

Syllabus of Medical History. By Victor Robinson, M.D., professor of history of medicine, Temple University School of Medicine, Philadelphia. Publisher, the Froben Press, Inc., 12 Mt. Morris Park West, New York, 1933. 110 pages. Price \$1.00.

In this well printed and illustrated book, the author of "Pathfinders in Medicine" gives a digest of his method in lecturing on medical history.

There are forty-seven questions, covering the periods from primitive times to modern. These are followed by appropriate and well written answers.

Then follows a specimen essay of the life of Duchenne of Boulogne. Following this are a number of excellent illustrations of primitive and Egyptian medicine, some photostatic reproductions and a chronological index.

An interesting and useful book, especially for those lecturing upon history of medicine.

G.D.P.

Hospitals and Child Health—Hospitals and Dispensaries, Convalescent Care, Medical Social Service. A publication of the White House Conference on Child Health and Protection. Published by the Century Co., 353 Fourth Avenue, New York, 1932. 279 pages. Price \$2.50.

"In only 86 urban municipalities in the United States of America are institutions definitely established for the care of patients suffering from the commoner communicable diseases of childhood."

"An appreciation of the value of

medical social service is but slowly seeping into the organization set up for the purpose of training students in Medicine."

"That hospital accommodation specially set aside for the medical care of children, under the charge of a competent paediatrist, is distinctly inadequate."

These statements and observations are based upon data and information presented in the most recent of the publications of the White House Conference on Child Health and Protection.

The volume is entitled "Hospitals and Child Health", and deals with the subject under appropriate headings, namely, Hospitals and Dispensaries, Convalescent Care, Medical Social Service.

As more and more volumes of the Conference findings are made available by the Century Press, one realizes how impossible it would have been to have carried out our original thought. When first presented with a list of the proposed publications, we said that, in these days of need for official economy, we would subscribe for only those in which we were intimately interested, and forego the others. I wonder how many of those who believed this to be a warranted economy have seen the necessity for purchasing each volume as it appeared, in order that nothing might be lost of the findings of this extraordinary organization.

This number is more than a mere compendium of appropriate knowledge, but is a statement of conditions as they exist, with suggested remedies.

J.T.P.

CURRENT HEALTH LITERATURE

These brief abstracts are intended to direct attention to some articles in various journals which have been published during the preceding month. The Secretary of the Editorial Board is pleased to mail any of the journals referred to so that the abstracted article may be read in its entirety. No charge is made for this service. Prompt return (after three days) is requested in order that the journals may be available to other readers.

Excess Mortality from Other Causes in Influenza Epidemics.

Death rates from influenza and pneumonia and from all other causes have been analyzed in weekly intervals for the years 1919 to 1929 for a group of 35 large cities in the United States. Weekly excess deaths credited to causes other than influenza and pneumonia present a picture strikingly similar in time distribution to excess deaths credited to influenza and pneumonia. Only half of the excess deaths credited to other causes were accounted for by deaths in which influenza and pneumonia were credited as a contributory cause of death. Organic heart diseases, nephritis, cerebral haemorrhage, diabetes, respiratory tuberculosis, bronchitis and puerperal conditions other than septicaemia, are the chief causes to which excess deaths from causes other than influenza and pneumonia are credited during influenza epidemics.

Collins, S. D., U.S. Pub. Health Rep., 47: 2159 (Nov. 11), 1932.

An Investigation of Individuals Exposed to Br. Abortus.

A group of patients known to have been exposed to Br. abortus infection over a period of years through an infected milk supply has been studied clinically and serologically. Evidence of active infection was shown by 22 per cent, 38 per cent showed evidence of past infection, while 40 per cent showed no evidence of infection. The cases of active infection were all of the ambulatory sub-clinical type. An intradermal skin sensitivity test was employed in addition to agglutination and complement fixation tests, and was found to be a distant diagnostic aid but no one of the three tests, taken alone, was found to be entirely specific, particularly in the group showing evidence of past infection.

Johns, E. P., Campbell, F. J., and Tennant, C. S., Canad. M.A.J., 27: 490 (Nov.), 1932.

Lobar Pneumonia in Massachusetts.

In connection with a study of lobar pneumonia in Massachusetts, 20 laboratories were used as typing centres to serve a population of 2 million. The Krumwiede, Sabin and tube-agglutination methods were largely used and were found to be 99 per cent accurate when definitely positive. The Sabin method was found to give a greater number of accurate positive typings in a shorter time than any other method studied. During the winter of 1931-32 all but 2 of

the 32 Cooper types of pneumococci were found. No especial geographic distribution of any of the types was evident.

Heffron, R., and Varley, F. M., Am. J. Pub. Health, 22: 1230 (Dec.), 1932.

The Pneumonia Problem in the Steel Industry.

There is a higher incidence rate of pneumonia among employees of the steel industry than in other industries as a whole. This is attributable to exposure to wide changes of temperature and to exposed, humid and draughty conditions of work. Measures designed to diminish the incidence are suggested.

Brundage, D. K., and Bloomfield, J. J., J. Indust. Hyg., 14: 345 (Dec.), 1932.

Respiratory and Puerperal Infections.

Puerperal infections in Boston City Hospital over a five-year period are compared with the incidence of respiratory infections in Boston over the same period. In general the curve of puerperal infection follows the curve of respiratory infection, but at a somewhat later date. There is, however, an unexplained rise of puerperal infection in June or July. Preventive measures, suggested by the relationship, are described.

Williams, J. T., J.A.M.A., 99: 1991 (Dec. 10), 1932.

Puerperal Morbidity.

A graphic method of recording puerperal morbidity and of comparing morbidity from month to month or year to year is described.

Philpott, N. W., Canad. M.A.J., 27: 593, (Dec.), 1932.

Undulant Fever Contracted in the Laboratory.

A case infected from a known source in the laboratory is described. Treatment with a bacterin was apparently of value.

Humphreys, F. A., and Guest, W. A., Canad. M.A.J., 27: 616 (Dec.), 1932.

Experimental Meningitis in Rabbits.

A clinical and histopathologic picture of acute meningitis may be produced in rabbits by intracisternal injection of virulent meningococci. This meningitis is an intoxication and not necessarily an infection since boiled meningococci and filtrates of meningococci produce an identical histopathologic picture.

Branham, S. E., and Lillie, R. D., U.S. Pub. Health Rep., 47: 2137 (Nov. 4), 1932.

Resistance to Poliomyelitis.

The resistance of adults to poliomyelitis and the distribution of immunity, as shown by neutralization tests, is generally accepted as evidence of sub-clinical immunization. According to this view the neutralizing antibodies are specific and are developed in the individual in response to personal contact with the virus (*vide* Kramer, S. D., J.A.M.A., 99: 1048, 1932). Jungeblut and Engle question this view on epidemiological and experimental grounds and elaborate the thesis that the neutralizing qualities of adult sera are a non-specific development which is part of a "physiologic maturation." In support of this theory they describe experiments in which various hormones were administered to immature monkeys. In a few instances, the sera of the animals acquired neutralizing qualities. The authors therefore suggest that "the mass protection enjoyed by the adult human population rests primarily on the normal function of the endocrine balance characteristic of mature age."

The evidence advanced is merely suggestive and only further research will show what part physiologic conditions or maturity may play in immunity to poliomyelitis.

Jungeblut, C. W., and Engle, E. T., J.A.M.A., 99: 2091 (Dec. 17), 1932.

Serology of Syphilis.

A choice of methods for the serum diagnosis of syphilis is a problem of special interest to public health laboratories. The author discusses the relative merits of the Wassermann and precipitation tests and emphasizes the importance of maximum sensitivity consistent with specificity of the reaction. In a comparative study of the Kahn precipitation, the Kline microscopic and the Wassermann test (Kolmer modification), 1,000 sera were examined and the results disagreed in 13.3 per cent. The author considers that the serum diagnosis of syphilis is best served by a carefully chosen complement-fixation and precipitation test on each serum.

Kolmer, J. A., Am. J. Pub. Health, 22: 1253 (Dec.), 1932.

Milk in Bottles with Single and Double Caps.

A comparative bacteriological study of milk in single and double capped bottles under conditions of city and rural delivery. Variation in the temperature to which the milk is exposed causes expansion and contraction which results in fluid being exuded or sucked in around the cap. The bacterial counts of the surface cream of single capped bottles averaged from 51 to 121 per cent greater than that of double capped bottles, while the whole milk counts were 38 to 64 per cent greater.

Isaacs, M. L., and Zeiber, I., Am. J. Hyg., 16: 806 (Nov.), 1932.

Self-Purification of Crude Sewage Liquors.

A discussion of the bio-chemical, bio-physical and physical principles underlying the self-purification of crude sewage liquors. Economical and satisfactory disposal depends on the completeness with which all solid organic impurities, suspended and colloid, are separated from impurities in true solution. Bio-chemical purification of the solid impurities is carried out under anaerobic conditions, that of impurities in solution under aerobic conditions.

Adeney, W. E., J. Roy. San. Inst., 53: 171 (Oct.), 1932.

Tuberculous Bacillaemia.

Lowenstein has claimed a marked success in culturing tubercle bacilli from the blood of both tuberculous patients and from those suffering from other diseases, but the results obtained by others following Lowenstein's technique have been either less successful or entirely negative. Dr. Cribbin carried out 190 cultures by Lowenstein's method from the bloods of 17 cases of advanced pulmonary tuberculosis and failed to obtain a single positive result.

Cribbin, John, Tubercle, 14: 163 (Jan.), 1933.

Laboratory Tests and Milk Control.

Apart from the determination of the presence or absence of pathogenic bacteria, laboratory tests of milk have two objects which are distinct but often confused, *viz.*, (1) determination of the condition of the milk as a marketable product, and (2) estimation of the cleanliness of production and storage before delivery. Tests of the keeping time of milk and possibly the reductase test are valuable in judging the marketable quality of the milk, but these tests bear no close relationship to the bacterial content. Bacterial counts and coli type enumerations show a general correspondence, but with a good many exceptions; and which of the two tests is the better test of clean production is not yet clear. Their general utility is diminished by the multiplication factor under different conditions of time and temperature. Further investigation is necessary before the best use can be made of laboratory tests and before guiding standards can be laid down.

Savage, William G., M. Officer, 48: 23 (Dec. 3), 1932.

Economic Depression and Public Health.

For the year 1931 the mortality in the large American and German towns was distinctly lower than the average for the preceding six years, and in the English towns was equal to the average. Exhaustive investigation of mortality in seven large European towns showed a similar decrease and also a definite and steady decline in tuberculosis mortality.

Quart. Bull. of the Health Organisation of the League of Nations, 1: 425 (Sept.), 1932.

